1 Preface

With the business servers in the SX series (abbreviated to: SX servers), Fujitsu Siemens Computers is pursuing its strategy of opening up the BS2000/OSD operating system by making available a modern hardware solution which is based on SPARC64™ technology and represents a future-safe investment for the customer.

The OSD Extended Configuration (OSD/XC) software package includes a ported variant of the BS2000/OSD basic configuration which offers high performance when run on the SX servers' SPARC64 architecture. Further software packages included in the OSD/XC package extend the functionality available in the basic configuration. Existing BS2000/OSD applications in the /390 world offer full object compatibility, i.e. they require no modifications, when run on the SPARC64 architecture of the SX servers.

The SX server hardware is based on the PRIMEPOWER server hardware. The business servers in the SX series can be divided into two classes: on the one hand the partitionable models, with facilities for using several separate runtime environments for BS2000/OSD and Solaris™ applications, and on the other hand the entry-level models without partitioning which offer a cost-effective way of entering the SX server series.

The hardware of the **partitionable models** is designed so that existing hardware components (CPU, main memory, controllers, disks, etc.) can be distributed across multiple partitions. This means that different, independent operating systems together with their available applications can be run on separate partitions. These operating systems and applications do not affect each other when they are running.

With their high availability and scalability, and the capacity for the parallel operation of several independent application environments, the partitionable SX server models provide an optimum basis for enterprise and business applications and for server and storage consolidation. At the same time they also open up the SX series to the varied application environment of the Solaris™ operating system.

The SX100 series models are the **entry-level** models of the SX series. These non-partitionable models are designed exclusively for use with BS2000/OSD. The SX series entry-level models with their high availability and favourable total-cost-of-ownership (TCO) form an optimum basis for the BS2000/OSD entry-level both for proven enterprise applications and for new enterprise and E-business solutions.

All SX series models have the latest processor technology and optional fibre channel interface technology for fibreCAT disk systems with possible SAN integration. These features ensure that SX series models are a future-safe investment.

Figure 1: Example of an SX server: SX150 Business Server

On the business servers in the SX series suitable redundancy facilities result from the operation of several partitions. These facilities are explained in more detail in the manual “SX Series Business Servers – Concepts and Functions” [1].

Moreover, almost all functional elements can optionally be designed and configured redundantly on an SX server (console interfaces, disks, power supply, peripherals, etc.).

Business servers in the SX series have the following partitions according to the operating system being run:

- BS2000 partitions
  The BS2000/OSD operating system is installed with the X2000 carrier system. X2000 is based on Solaris and essentially provides the runtime environment for BS2000/OSD. As an alternative to the native operation of BS2000/OSD, depending on the model up to 15 independent BS2000/OSD guest systems can be operated under VM2000.
- Solaris partitions
  The Solaris operating system is installed.

Each partition can be set up either on the basis of the physical partitioning PPAR or on the basis of the extended partitioning XPAR. You will find more details on this in the appendix (page 385ff).

X2000 is based on the Solaris operating system and provides the following functions:

- HAL (Hardware Abstraction Layer)
  HAL maps the hardware-software interfaces of the /390 mode to equivalent interfaces of the SPARC64 mode.
- /390 firmware
  The /390 firmware component extends the SPARC64 mode and enables existing customer applications to run object-compatibly on the SX servers under OSD/XC. This applies both for applications generated with ASSEMBH and also for programs which were generated with the BS2000 compilers for high-level programming languages. As of OSD/XC V2.0 and X2000 V3.0A05 the SX servers also support ESA data spaces in customer applications. Objects which are available in the special RISC object format for SR2000 must be recompiled. The commands supported by ASSEMBH are described in the manual “Assembler Instructions (BS2000/OSD)” [16].
- Execution of the inputs/outputs and data communication
- Administration and operation of the SX server

Entry-level models in the SX series

The entry-level models in the SX series are non-partitionable and designed for use exclusively with the BS2000/OSD operating system. BS2000/OSD running on entry-level models uses the functionality of the X2000 carrier system.

With these models, too, state-of-the-art processor technology, the efficient LTO tape device, and optional fibre channel connection technology for FibreCAT and Symmetrix disk systems and for CentricStor and ITC/SBU with SAN integration capability make these servers a future-safe investment.

You will find more detailed information on the hardware of the different model series in the appendix (page 385ff).

1.1 Documentation for the SX Series Business Servers

Extensive documentation is available to help you in your work with SX servers. It can be ordered in printed form as a documentation package.
Its exact composition can be found in the Release Notice for OSD/XC.

The following manuals have been published specifically for the SX server series:

- **SX Series Business Servers**
  Concepts and Functions
  User Guide

  This manual provides an overview of the features and special characteristics of the SX server. It also provides information concerning the OSD/XC-based extensions to BS2000/OSD.

- **Operating Manuals for the SX Servers**

  These manuals describe the particular SX server and its hardware components. They also provide information on hardware operation.

- **SX Series Business Servers**
  Operation and Administration
  User Guide

  This manual contains all the information necessary to operate an SX server. It includes information on configuring the system together with a description of important functions for its operation and administration.

- **OSD/XC**
  Performance Guidelines
  User Guide

  This manual focuses on the principles and measurements involved in evaluating the performance of BS2000/OSD applications which run on SX servers. The performance-related characteristics of the SX server architecture are described together with the underlying operating sequences. Extensive information on tuning the configuration and the software make it possible to optimize the economic efficiency of OSD/XC operation.

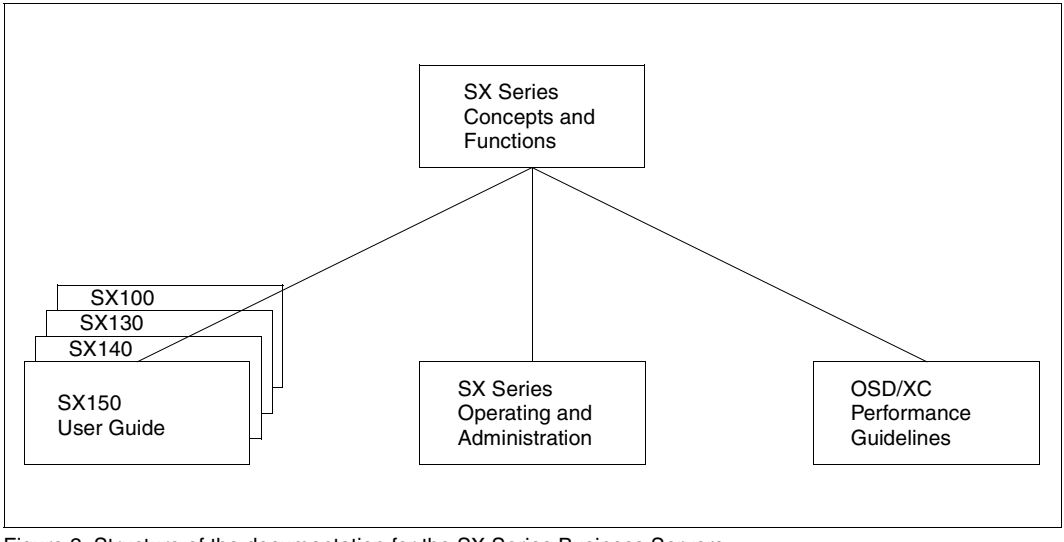


Figure 2: Structure of the documentation for the SX Series Business Servers

The **core literature** for the SX Series Business Servers in the BS2000 environment consists of:

- the manuals for the BS2000/OSD-BC V6.0 basic configuration
- the manuals for the shipped versions of OSD/XC software products
- the manuals for the current versions of system-related software products which can be purchased separately

The following manuals in the core literature have been extended or replaced for OSD/XC:

Manual	Comment
BS2000/OSD-BC Performance Handbook	Replaced by: OSD/XC Performance Guidelines
BS2000/OSD-BC System Exits	Only valid in connection with Special Release

The “OSD/XC Migration Guide” will be discontinued. As of the edition of June 2005 migration to SX servers is described in the “BS2000/OSD-BC Migration Guide” [3].

Readme files

For information on any functional changes or extensions, please refer to the Readme file for the BS2000/OSD-BC V6.0 basic configuration or the product-specific Readme files for the various software products:

```
SYSRME.<product>.<version>.E
```

Examples

```
SYSRME.BS2CP.060.D (BS2000/OSD-BC V6.0)
SYSRME.PERCON.028.D (PERCON V2.8)
```

Please refer to the appropriate system administrator for the user ID under which the required Readme file can be found. You can also obtain the path name of the Readme file directly by entering the following IMON command:

```
/SHOW-INSTALLATION-PATH INSTALLATION-UNIT=<product>, LOGICAL-ID=SYSRME.E
```

You can view the Readme file with `/SHOW-FILE` or by opening it in an editor or print it at a standard printer using the following command:

```
/PRINT-DOCUMENT $<userid>.SYSRME.<product>.<version>.E,
                LINE-SPACING=*BY-EBCDIC-CONTROL
```

Additional literature, in particular for the PRIMEPOWER servers and the products in the Solaris environment, is available to complement the SX server documentation.

1.2 Target groups

This manual is intended for privileged users (operators, system administrators) of the SX series business servers. It is assumed that readers possess a thorough understanding of the operating system and the hardware and have a basic knowledge of the graphical user interface PRIMEPOWER ServerView.

1.3 Summary of contents

You will find general information on the operation of an SX server in the chapter “Operating concept of the SX servers”. This information includes:

– Operating concept for SX servers with the System Management Console (SMC)
– Operating concept for SX server entry-level models
– Remote operation of each LAN PC
– Notes on security for SX servers with SMC
– Remote Service (Teleservice)
– Procedures for switching the server (with SMC) on/off
– Procedures for switching the server (entry-level models) on/off

The chapter “Functions of the Solaris-CDE interface” describes the X-window interface CDE (Common Desktop Environment) for controlling the SMC (System Management Console).

The chapter “Functions of the System Management Console” explains the hardware operation of the server and administration of the partitions.

The chapter “Functions of the SX server entry-level models” describes the switching on/off functions, the integrated console, an optional LAN console and the time cluster with external time servers for the entry-level models in the SX series.

The chapter “Remote operation via PC” discusses the recommended hardware and software configuration and gives instructions on the configuration and operation of the recommended software.

The chapter “Operating BS2000 instances” describes the operation of the BS2000 console and dialog, as well as the event mode.

The chapter “The X2000 user interface” provides an overview of the functions of the X2000 interface provided in PRIMEPOWER ServerView. For details on individual menus and dialog boxes refer to the online help.

The chapter “Global X2000 functions” describes the configuration of the SX server in PRIMEPOWER ServerView.

The chapter “Dynamic Reconfiguration” describes how Dynamic Reconfiguration can be performed for BS2000 partitions and the requirements for this. This function is available on SX servers as of the SX150 model series.

The chapter “Solaris: system administration” gives an overview of the system administration in Solaris with reference to one or two examples.

The chapters “What if ...” and “X2000 messages” contain information on the detection and removal of faults.

The appendix provides information on the hardware properties of the business servers in the SX series and on the optional SKP-SR for BS2000 operation.

This is followed by a list of abbreviations and figures, the related publications and an index.

1.4 Notational conventions

The following fonts and symbols are used in this manual to indicate different types of information:

Font/Symbol	Indicates	Example
AaBbCc123	System outputs are written in this typewriter font.	RC2000%
AaBbCc123	Commands entered by the user are written in typewriter font bold	# ls -l <Return>
Italic text	Program interface functions and menus are written like this.	Select the menu *Edit local parameters*
“ ”	Manual, chapter and section titles are enclosed by double inverted commas. The names of positions, keys, buttons and menus are also enclosed in double inverted commas.	See chapter 3, “Configuration of the System Console“, in the “System Console Software User’s Guide (SCS)“ [7].
[...]	Square brackets indicate a reference to related publications. The full title and details of the reference document are given in the “Related Publications” section.	see “Migration Guide“ [3].
►	The enter symbol indicates an action that the operator must perform (e.g. enter something on the keyboard).	► Click the button *VConfig*.
	Indicates warnings.	
	Indicates important information about product operation.	

2 Operating concept of the SX servers

SX servers (with the exception of entry-level models) are operated via the system management console (SMC) as the central console for the hardware and for the BS2000 and – optionally – Solaris operating systems. The business servers of the SX series, with the exception of the entry-level models, are therefore also referred to in the following as “SX servers with SMC”.

A concept has been developed for uniform operation of the different operating systems. This operation is described in the section “Operating concept for SX servers with SMC” on page 12.

The entry-level models in the SX series are also operated centrally with the integrated console or an optional LAN console. For operating the entry-level models see the section “Remote operation via LAN-PC” on page 16.

Remote administration can be performed from PCs separate from the computer center. These can be used to administer the server and to configure and operate the instances of BS2000 (e.g. remote BS2000 console) and, optionally Solaris, on the basis of a uniform concept.

2.1 Operating concept for SX servers with SMC

The figure below shows the operating concept of an SX server with SMC and a BS2000 and Solaris partition, taking the example of an SX130 configuration:

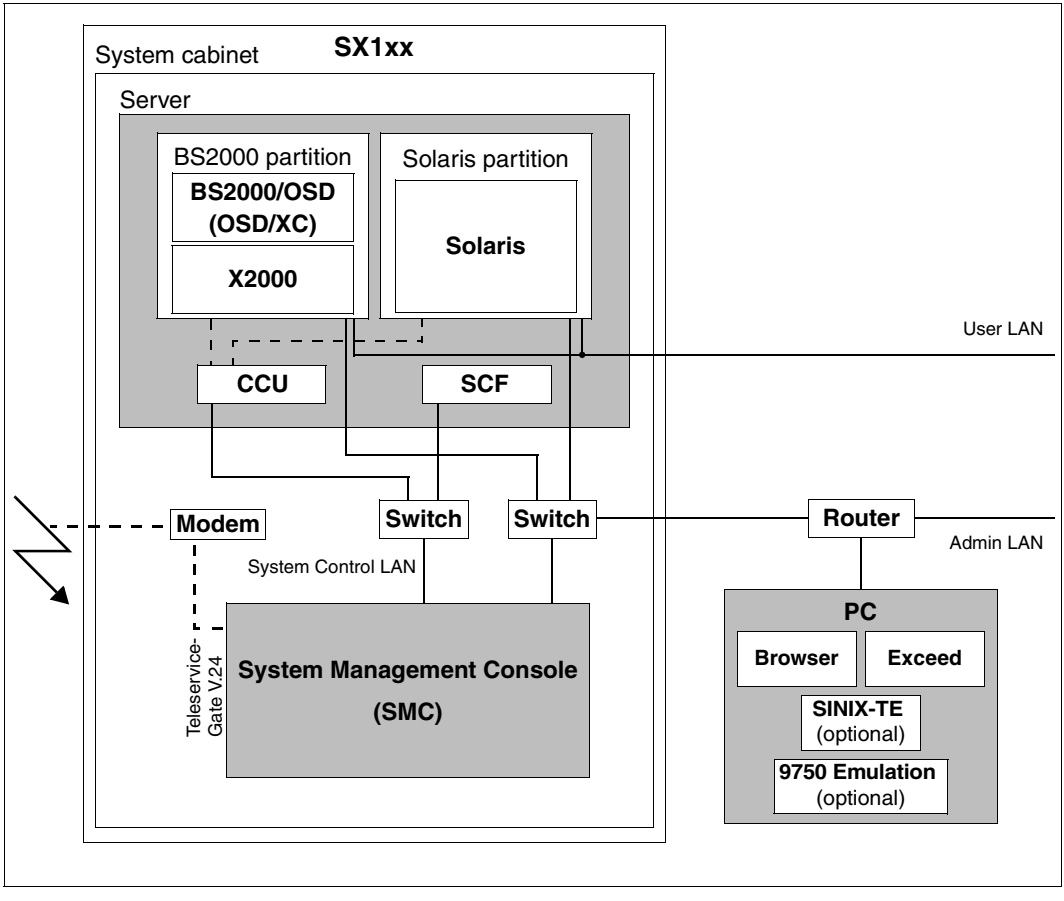


Figure 3: Example of an operating concept for an SX server

Up to and including SX140 the SMC for an SX server is based on a PRIMESTATION system with Solaris 8. The SMC for an SX150 server is based on a PRIMEPOWER250 system with Solaris 9. The user interface for all functions is the X-Window Common Desktop Environment (CDE) interface. This is where the System Console Software (SCS) runs. This is used to administer the hardware functions of the SX system, and in particular the functions for starting up/shutting down the server and partitioning the system.

The DVD/CD-ROM drive of the SMC can be used across partitions. In this way, operating systems and applications can be installed in every partition of the SX server.

System administration of X2000 functions (and optionally, Solaris functions) can be performed from any client via the PRIMEPOWER ServerView graphical user interface. To do this, you will need a Web browser which has Java support. The SMC server names and the names of all the partitions present on the SX server must be entered in the DNS. The PRIMEPOWER ServerView application *Domain* makes it possible to perform administration tasks outside of the local system. This means that administrators can administer clusters of systems as a single system. So it is not necessary to perform each action for every system individually and helps avoid errors.

The *Domain* application can support multiple BS2000/OSD instances and Solaris partitions in a single PRIMEPOWER ServerView session.

The BS2000 console and dialog can be operated in the dtterm terminal emulation mode of the X-Window CDE interface. The X2000 applications KVP software and 9750 emulation provide the necessary functionality.

The individual SMC functions are described in detail in chapter “Functions of the System Management Console” on page 43ff.

2.2 Operating concept for SX server entry-level models (without SMC)

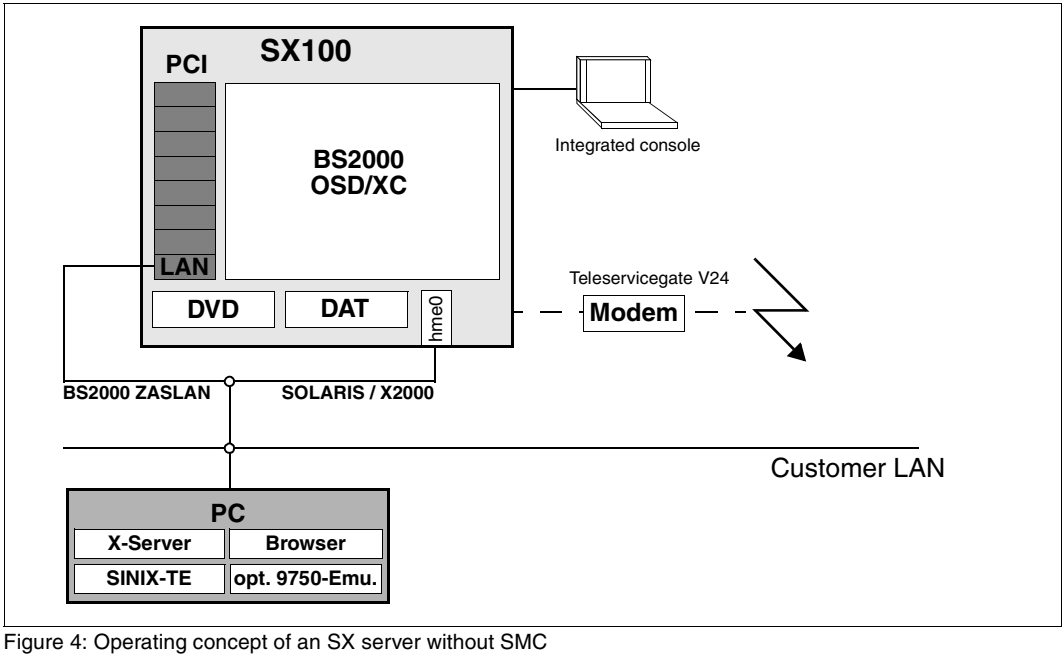


Figure 4: Operating concept of an SX server without SMC

An SX server entry-level model is operated as standard via the integrated console. The operator interface for all functions is the X-Window interface CDE of the Solaris/X2000 carrier system. Here the interface provides functions for all the instances to be operated, such as BS2000 console, BS2000 dialog, X2000 configuration and hardware administration.

Hardware components consist of a DVD/CD ROM drive for installing the operating system and applications, and a DAT drive for backup purposes.

2.2.1 Operation with integrated console

The entry-level models are operated from an integrated console with screen, keyboard and touchpad installed in a rack.

The console is a Solaris console device on which the messages of the Solaris and the X2000 carrier system can be monitored when starting up the server (e.g. after switching on). This therefore gives you access to the OpenBoot PROM.

The console also provides the user interface for all the required functions after starting up the server. The individual functions are described in detail in the chapter “Functions of the SX server entry-level models” on page 125.

2.2.2 Operation with a LAN console and remote console adapter

The figure below shows an operating concept for an entry-level model with a LAN console and a remote console adapter:

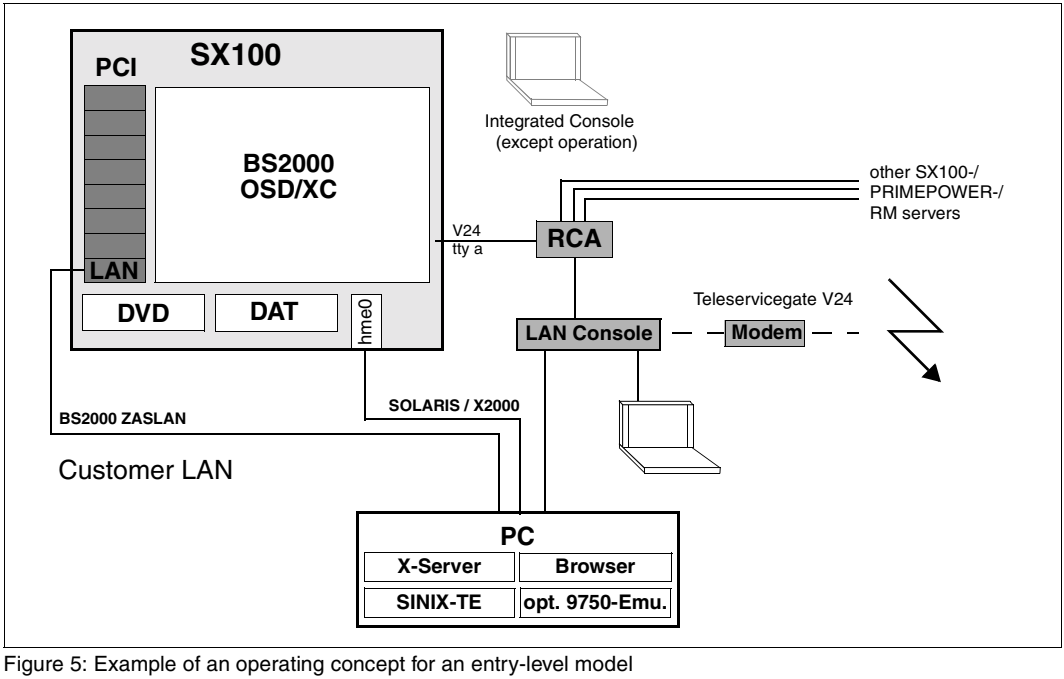


Figure 5: Example of an operating concept for an entry-level model

As an alternative to the integrated console on entry-level SX series servers, you can use a LAN console together with a V24/Ethernet converter, the remote console adapter (RCA).

The LAN console is available for administering UNIX/Solaris midrange servers and SX server entry-level models from Fujitsu Siemens Computers Gmbh. The LAN console has the following features:

- It supports the installation, configuration, administration and diagnostics management of one or more connected SX server entry-level models, RM servers and PRIMEPOWER servers.
- The LAN console can be used to perform all the functions of a character-orientated screen, including the OBP monitor and a reboot of the system.
- The selection and display of one or more consoles of SX, RM and PRIMEPOWER servers are performed by the tool xscon.
- Support of PRIMEPOWER ServerView (Web-based system administration).
- The SX server entry-level models and RM and PRIMEPOWER servers can also be booted remotely (via LAN).
- The Teleservice connection for all systems is available centrally on the LAN console.

2.3 Remote operation via LAN-PC

If remote operation of the SX server is required, it is possible to use PCs with a network connection to the server's SMC.

If an X server is employed, then it is possible to make use of the SMC user interface. This means that it is possible to access the System Console Software (SCS) using the same interface as is available directly at the SMC.

Administration of the SX business server partitions using PRIMEPOWER ServerView is possible either by calling PRIMEPOWER ServerView in the CDE user interface, via the Start button, via an icon on the desktop, or directly in the PC's browser. The BS2000 console and dialog can be operated in the SMC `dtterm` windows.

Alternatively, SINIX-TE can be used as a 97801 emulation in order to provide support for Fujitsu-Siemens emulation keyboards for BS2000 (this is not possible when establishing a communication using the Secure Shell).

If an SKP-SR is present, then this can also be used to provide support for 97801 emulations for BS2000 console and dialog access (this is only released on SX130 servers but cannot be used for communication when the Secure Shell is employed).

For further information on hardware and software requirements as well as on configuration, refer to chapter “Remote operation via PC” on page 133ff.

2.4 Notes on security

With an SX business server you can connect multiple systems to each other to form an operating cluster. Entry-level models in addition to the operating system BS2000/OSD now have the carrier system X2000 available as an additional system. This means that for administration and operating purposes you will require access to a number of different logins. The access to these logins (and in particular to the root login) has security-related implications. The sections below provide some notes on access control.

2.4.1 Passwords

The business servers in the SX series are shipped with standard passwords for access to the X2000 carrier system, Solaris (in the case of Solaris partitions) and the SMC.

These passwords must be changed by the customer, particularly for the root logins on the corresponding systems!

When assigning passwords, we recommend that you follow these general rules:

– Passwords must be changed at regular intervals.
– Passwords can contain characters, figures and special characters.
– Passwords must not be stored on the system or on the remote workstations.

2.4.2 Login access to root in the partitions

In the SX business server as it is supplied, root access to the partitions is possible only via the console, either on the SMC (see section “Consoles of the partitions with RC2000” on page 86) or, for entry-level models, on the local console.

In the system as supplied, a remote login to the root login via a network is therefore not possible.

This is achieved by setting `CONSOLE=/dev/console/` in the file `/etc/default/login`.

This entry must not be changed into a comment!

Generally speaking, it is not necessary to possess login access to the root login in order to administer partition systems (of, for example, entry-level models) because PRIMEPOWER ServerView is provided for this purpose. This is particularly true in the case of BS2000 systems.

However, should it become necessary to work under the root login then it is advisable to set up user-specific logins under which login can be performed. Only then should the user acquire root permissions by means of the `su` command.

User-specific IDs can be set up in the *Users* application of PRIMEPOWER ServerView in the Users tab by clicking on the Users button and selecting the *Create* function (for details please see the section “Administration of PRIMEPOWER ServerView” on page 53).

The advantage of this procedure is that root requests are logged in the sulog file. This ensures that there is a record of when which users have acquired root permissions.

2.4.3 FTP access to root

This is similar to login access. File transfer with root permissions also calls for certain security-related considerations. For this reason, FTP access to `root` is not possible by default. This is achieved by setting `root` in the file `/etc/ftpusers`.

This entry must not be changed into a comment!

It is better to start by performing the transfer under a user-specific login. As described above, the files can then be copied to the target location by using the `su` command with the appropriate authorizations to request the root permissions.

2.4.4 User roles for SX servers with SMC

Depending on the extent to which it is necessary to separate Solaris and BS2000 administration and operation, there are a number of different ways of performing these tasks.
A number of related scenarios are presented below:

- Joint administration of the server, the configuration and operation by system administration

  In the simplest case all the server administration tasks are performed by a restricted user group. In this case, all the members of this user group are able to access the SMC from where they perform all the necessary tasks.

  The SMC is not accessed via the root login but under one or more server administrator logins belonging to the *cladmin* group (see section “User groups and logins” on page 44).

- Separate server administration and partition administration

  Each partition on the SX server can have its own partition administrator. The partition administrator possesses the rights necessary to switch the partition on and off and access the partition's hardware console.

  For information on setting up a login for a partition administrator, refer to section “User groups and logins” on page 44. This login is a member of the *clmon* group and a partition administrator group that you will need to create.

- Administration of operating systems in partitions without partition administration rights

  If necessary for the purposes of operating system administration and operation, it is possible to create logins which do not possess any extended rights for the administration of the server or the partitions. These logins should be members of the *clmon* group in order to ensure that the SCS read access functions are available at the partition's hardware console. For more information, see section “User groups and logins” on page 44.

The following logins have already been created as supplied to manage the server on the SMC:

- A server administrator login *sxadmin*
- A partition administrator login *bs2admin* for the BS2000 partition
- A partition administrator login *soladmin* for any Solaris partitions present

It is recommended that you use these logins to administer the server.

2.4.5 Security when accessing BS2000 operation functions

The following protective mechanisms can be set up when configuring BS2000 console access:

BS2000 operation is performed via a login in X2000 for which a separate password is required. This password must be subject to the usual password maintenance rules. The logins from `cons0` to `cons7` are provided as default for this purpose. The administrator defines any additional logins via PRIMEPOWER ServerView.

Running operator terminals (BS2000 consoles) can be secured via the main KVP function menu (see the section “The Main KVP Function Menu” on page 164) by locking the inputs on the BS2000 system. To reset this lock, it is necessary to enter the password. This does not affect message output.

To connect additional operator terminals via LAN, it is always necessary to enter a password.

All the inputs and outputs can be recorded in a logging file and then archived. In the case of high security requirements, the option for both logging and archiving should be set to FORCED. These settings are made in the Bs2Devices application of PRIMEPOWER ServerView by clicking on the BS2-KVP tab, selecting the first entry for a KVP name, clicking with the right mouse button, and selecting the function “Show or modify logging options”.

Activating these options also has the effect of recording all inputs and outputs in the logging file. This results in an increase in the size of the logging file. You should therefore check the size of the logging files and free space in the file system at regular intervals.

2.4.6 Secure access with Secure Shell (open SSH)

Where tight security for the remote operation of SX series business servers is specified, Secure Shell (SSH) is an ideal solution for secure remote logins, executing commands, and file transfers for administration purposes.

The most commonly used and most widespread application of Secure Shell is the secure remote administration of servers in business networks. The Secure Shell protocol is used worldwide on innumerable systems and Secure Shell technology has been developed as a de facto standard in the area of application connection.

Secure Shell is an application which protects TCP/IP connections between two computers. The connection is coded on the application layer, which means that the security provided by Secure Shell is independent of the type or speed of the network connection.

In the business servers in the SX series Secure Shell is used for the connection between the administration PC and the system management console (or the server directly in the case of the entry-level models) and also the partitions.

The product OpenSSH is used on the BS2000 partitions, the Solaris partitions with a Solaris version up to and including V8, and the SMC of the partionable servers up to and including SX140. The Secure Shell Software from Sun which is integrated into Solaris from V9 on is used on Solaris partitions with a Solaris version as of V9, and the SMC as of the SX150 model series. Both products support both Version 1 and Version 2 of the SSH protocol.

If the SSH is to be used on the BS2000 partition (i.e. the product OpenSSH is installed), the rlogin, rsh, rcp, ftp and telnet services offered on the LAN are deactivated automatically and they are replaced by the equivalent SSH interfaces ssh, scp and sftp. In this case the host- and ID-specific SSH configuration files (both in the partitions and on the SMC) are included in the system data backup; X2000 itself then uses a secure transfer mechanism based on DomainAdmin of the PRIMEPOWER ServerView Suite for communication between the partitions and the SMC.

The following features of Secure Shell are used:

- Powerful authentication mechanisms

  With the asymmetrical process for private/public keys at host and user level SSH incorporates powerful authentication mechanisms. Here the private keys can be protected by pass phrases. Integration into other authentication procedures such as Kerberos, SecurID, PGP, TIS Gauntlet and PAM is also possible.

- Strong encryption

  Open SSH uses, among other things, 3DES and Blowfish as the encryption algorithms. Both are unpatented. Here SSH Version 2 offers considerably more and more powerful encryption algorithms than Version 1. Encryption commences before authentication. No passwords, private keys, commands or user data are transmitted in plain text.

- X11 Forwarding

  X11 forwarding enables X-Windows network traffic to be coded in such a way that no one is able to read the data traffic simultaneously or slip in malicious commands. The data traffic for administration of the SX servers as part of the operating concept is therefore protected.

- Port Forwarding

  Port forwarding enables TCP/IP connections to be forwarded to a remote machine via a coded protocol. Applications can therefore be made more secure.

Components of the SSH

The SSH suite comprises the client program `ssh` which replaces `rlogin`, `rsh` and `telnet`, Secure Copy `scp` which replaces `rcp`, and the Secure File Transfer Programm `sftp` which replaces `ftp`. The client program `ssh` is used to set up a connection to a remote system and to execute commands on a remote system.

The SSH suite also includes some administrative components such as the SSH daemon `sshd` on the server side, the `ssh-keygen` function for generating, administering, and converting authentication keys for SSH, and the `ssh-agent` and `ssh-add` functions for controlling the SSH authentication agent.

Specifications for these functions are available on the Internet (e.g. at the URL `http://www.openbsd.org/cgi-bin/man.cgi`). The use of keys and of the authentication agent is described in detail in the section “Key management for Secure Shell” on page 153.

For details on installation and configuration and the application and use of Secure Shell see the section “Access with Secure Shell” on page 144.

2.5 Remote service (Teleservice)

Teleservice gives you rapid access to the service staff and the service staff rapid, targeted access to your system if this should be required.

Depending on the SX server specification, the Teleservice connection for all partitions is centrally located on the SMC or, in the case of entry-level models, directly on the SX server itself. This means that only one connecting line to the service center is required.

The Teleservice settings should only be made by a service engineer. The following sections are therefore for information only.

The following are provided for Teleservice purposes:

- An ISDN modem including the necessary cable connections
- A power connection (230V)
- The Teleservice software
- The file transfer software
- Teleservice Call Management and Remote Service 2000 for the BS2000 Teleservice connection which is supplied together with X2000

- An ISDN telephone connection is also required in the vicinity of the system.

If no ISDN connection can be provided then an analog modem must be ordered separately.

Teleservice Call Management is a central instance in X2000 which makes it possible to automatically report error messages from the Solaris/X2000/BS2000 area of a partition to the Teleservice center.

The error messages are assembled in logs by Logging V3.0 and are then categorized by message type and passed to Teleservice Call Management in the form of Teleservice calls. This processes the messages before routing them on to Remote Service 2000 (rs2k). The Remote Service 2000 transfers the messages to the Teleservice center.

Logging V3.0 has a user interface that can be called via the PRIMEPOWER ServerView (*System - Diagnostics* button). By default, all the settings are configured in such a way that the corresponding error messages can be selected and forwarded as Teleservice calls.

Teleservice Call Management does not possess its own user interface since no configuration measures are required from the user here. Any Teleservice Call Management error messages are stored in Logging V3.0 with the ID SMAWLtsca in the module name.

Remote Service 2000 has a user interface which is not dependent on PRIMEPOWER ServerView and which can be used to configure the settings for the transfer of Teleservice calls.

For further information on Teleservice in Solaris, refer to the manuals “Teleservice (Unix)” [31], “LAN Console or System Management Console (SMC)” [9] and “Solaris System Diagnostics” [28].

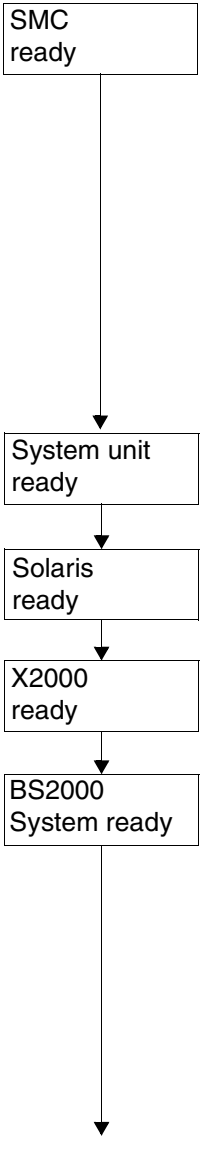
2.6 Overview of operating sequences on server switch-on / switch-off

This section gives an overview of the actions and operating sequences involved in switching the SX server on and off.

The commands and actions refer to the operation of a variety of functions. These are explained in detail in the individual chapters and here are simply listed in summary form as a comprehension aid.

2.6.1 SX server with SMC

2.6.1.1 Switch-on of the SX server and automatic start-up of the operating systems



- Power on the server
  (described in the SX1xx Operating Manual [2])
- Start up the System Management Console (SMC)
  (described in the SX1xx Operating Manual [2])

  This automatically starts Solaris at the SMC as well as the System Console Software.
- Log in as server administrator *sxadmin* at the SMC (described in section “User roles for SX servers with SMC” on page 18 and in section “User groups and logins” on page 44).

  Open the Machine Administration Menu and start up the server (described in section “Machine Administration Menu” on page 58.

  This powers up the system unit. After the POST (Power On Self Test), the Solaris operating system and, in BS2000 partitions, X2000 are started automatically.

  For automatic start-up to be possible, the mode selection switch at the control panel must be set to LOCK (see SX1xx Operating Manual [2])

  The start-up of the X2000 and Solaris systems can be monitored at the RC2000 consoles (for more information, see section “Consoles of the partitions with RC2000” on page 86).
- When X2000 is started, BS2000 OSD/XC is also started automatically provided that this operation has been enabled by setting automatic IPL. This setting is recommended for automated operation (for more information, see page 215 and the online help system for BS2Devices in PRIMEPOWER ServerView).

  BS2000 start-up can be monitored at the BS2000 console. For information on calling a console window, see section “BS2000 console mode” on page 159.

  Once the BS2000 system has reached Dialog-System-Ready, dialog access is possible (for more information, see section “EM9750 mode” on page 182).

Figure 6: Operating sequences when switching the SX server on/off

2.6.1.2 Automatic termination of operating systems and server switch-off

An SX server with SMC is switched off in the same way it is switched on, i.e. via the SCS Machine Administration Menu on the SMC. When the server is switched off, the Solaris systems in the Solaris partitions are terminated automatically, BS2000 in the BS2000 partitions is terminated with a shutdown command and then, finally, X2000 is terminated (see also “Definition of the BS2000 shutdown command” on page 216 and the corresponding PRIMEPOWER ServerView online help).

In cases where application dependencies have to be taken into account, it is advisable to terminate the individual operating systems one-by-one in order to be able to monitor the progress of these actions.

Solaris systems are set to Run-Level 5, i.e. Power Off. This means that the corresponding partition is already terminated.

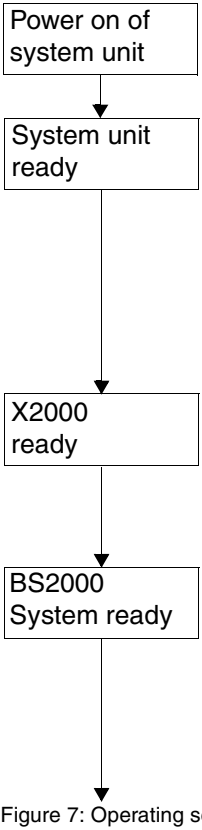
In BS2000 partitions, the BS2000 shutdown occurs first. Following this, the partition must then be switched off via the Machine Administration Menu at the system console (see section “Switching partitions off” on page 65). This automatically terminates the X2000 system.

When the last partition on the server is switched off, the entire server itself is also automatically terminated.

The system console (SMC) should always be left running to permit the continued (remote if necessary) administration of the server. This is particularly important if a schedule for automatic switch-on/switch-off via APCS has been activated (for more information, see section “Switching the server on/off on a scheduled basis” on page 66).

2.6.2 SX server entry-level models

2.6.2.1 Switch-on of entry-level model and automatic start-up of BS2000/OSD



- Power on the system unit
  (see SX100 operating instructions [2])
- This starts up the system unit. After the POST (Power On Self Test), X2000 is started automatically.

  For automatic start-up to be possible, the mode selection switch on the control panel must be set to the LOCK (see SX100 Operating Manual [2]).

  The start-up of the X2000 system can be monitored on the local console (see SX100 Operating Manual [2]).
- When X2000 is started, BS2000/OSD is also started automatically provided that this operation has been enabled by setting automatic IPL. This setting is recommended for automated operation (for details see page 215 and the online help of the application *BS2Devices* in PRIMEPOWER ServerView).
- The start-up of the BS2000 can be monitored on the BS2000 console. Calling a console window is described in the section “BS2000 console mode” on page 159.

  Once the BS2000 system has reached Dialog-System-Ready, dialog access is possible (for this see section “EM9750 mode” on page 182).

Figure 7: Operating sequences when switching SX server without SMC on/off

2.6.2.2 Automatic termination of BS2000/OSD and server switch-off

An SX server without SMC is switched off in the same way it is switched on, i.e. using the switch on the system unit (see SX100 Operating Manual [2]). When the server is switched off, BS2000/OSD is terminated automatically for each shutdown, then X2000 is terminated. The server is then switched off.

However, when consideration has to be given to dependent applications, it is advisable to terminate the operating system BS2000/OSD specifically to monitor the progress of these actions.

3 Functions of the Solaris-CDE interface

The business servers in the SX series are operated from the console of the server with the Solaris user interface. This user interface is called Common Desktop Environment – abbreviated to CDE. Here, the interface provides not only functions for operating Solaris (or the X2000 carrier system) but is also used for operating BS2000 instances. Details on operation are given in the following section.

Here the console of the corresponding SX server can be either the system management console (SMC) or, in the case of the SX series entry-level models, the local console of the server or a LAN console. Since the commands for calling the functions are different for the SMC/LAN console and local console, they are listed separately in the following sections.

In addition to the consoles, the CDE interface can also be operated remotely from administration PCs (see chapter “Remote operation via PC” on page 133).

3.1 CDE interface

Login screen

When the system console has been switched on, the following login screen appears (this example is for the SMC):

Figure 8: CDE login screen (user name)

► Enter your user name in the text box (e.g. *sxadmin*; see the following section). Then click the *OK* button.

A new window appears in which to enter your password:

Figure 9: CDE login screen (password)

► Enter your password in the text box. Then click the *OK* button.

If this is the first time you have logged in, the following windows appear on the system console (this example is for the SMC):

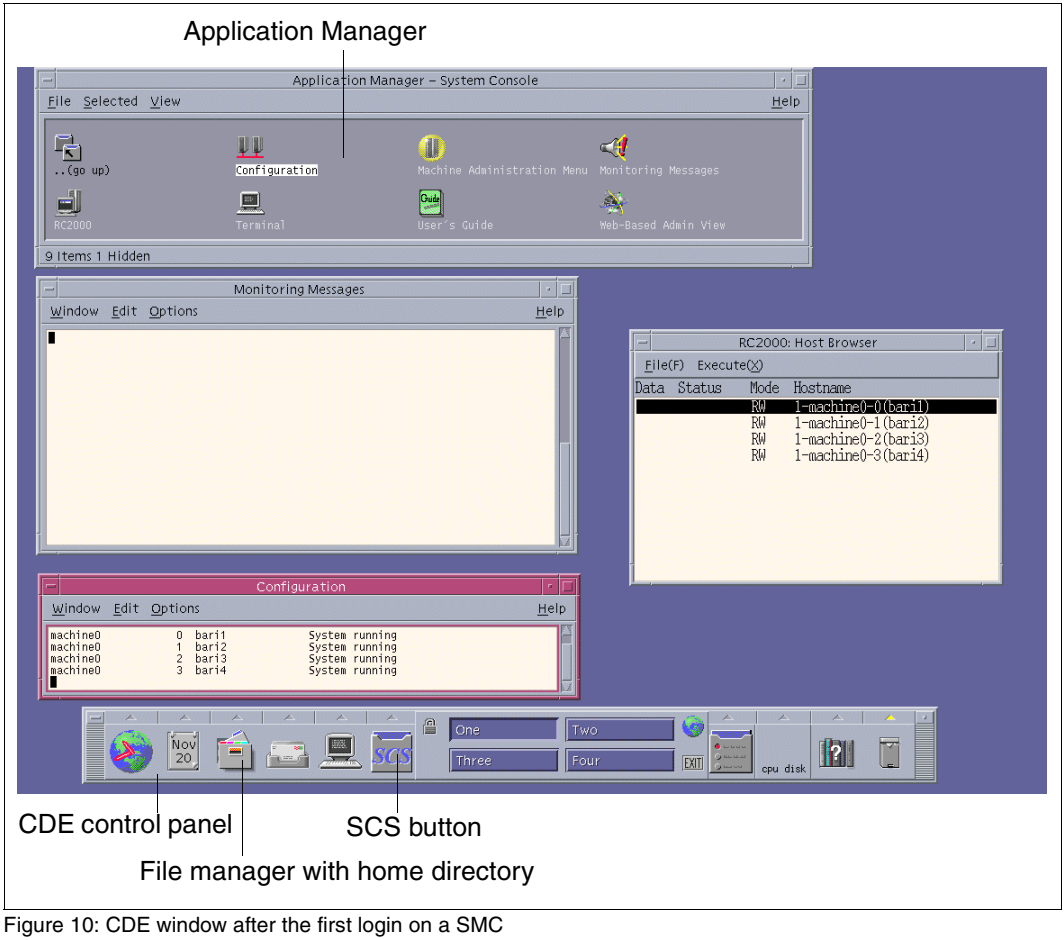


Figure 10: CDE window after the first login on a SMC

The next time you log in, the interface will appear in the form it was when you terminated the CDE.

The Application Manager of the System Console Software (SCS) from which the functions can be activated looks like this:

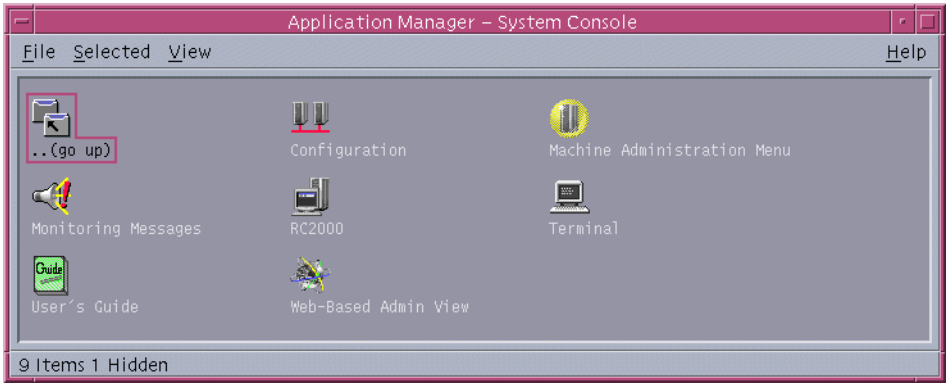


Figure 11: Application Manager of the System Console Software (SCS)

A double-click calls up the functions.

3.2 System administration of BS2000 and Solaris (optional)

In the case of SX servers (not entry-level models) you must access the partitions in order to be able to administer the operating systems in the individual partitions. This is provided on the one hand by the consoles of the partitions supplied on the system management console (SMC) of RC2000, and on the other by the network access of the SMC via the administration LAN of the server.

In the case of the entry-level models, you access the partitions from the local console on which you logged on directly to the system.

The administration of BS2000 systems requires access to the BS2000 console and a BS2000 dialog access. Here access is provided via preconfigured X2000 user IDs in the system.

For the sake of simplicity and increased operating security, the CDE user interface is configured so that it is possible to call the individual instances at a mouse click.

This has already been done in the factory for the predefined user IDs `sxadmin` (server administration of all the SX servers), `bs2admin` (BS2000 administration; not for the entry-level models) and `soladmin` (Solaris administration; only if a Solaris partition is available).

In the case of the SX servers, except for the entry-level model, icons are set up on the SMC, under these user IDs, for access to the Solaris partitions (only in the case of the identification `sxadmin`), for the BS2000 console, for the BS2000 dialog and for PRIMEPOWER ServerView of the BS2000 partition. The functions for hardware administration are provided by the system console software on the SMC (see chapter “Functions of the System Management Console” on page 43).

In the case of the entry-level models, icons are set, under the user ID `sxadmin`, for access to the BS2000 console, to the BS2000 dialog, to PRIMEPOWER ServerView and to the hardware administration with the machine administration menu.

In the next section a description is given of how these CDE actions (e.g. for further user-specific IDs) can be set up or modified.

3.3 Preconfiguring terminals

The preconfiguration for accessing the individual functions is based on the creation of an “action” in the CDE interface of the Solaris system on the SMC or on the X2000 carrier system. An icon is assigned to a command sequence. The configured commands can be called up via this icon simply and without a risk of operator error.

The icons can be stored in various places, for example, directly on the CDE desktop or on the control panel of the CDE interface.

The basic procedures for creating this “action” and storing the relevant icon are described first in an example for accessing a BS2000 console. Then a description of the commands used to access the individual instances (Solaris shell, BS2000 console, etc.) is provided.

The CDE desktop provides the function *Create Action* for creating actions. This tool can be called up either via the Application Manager in the subfolder *Desktop_Apps* or directly via the context menu of the desktop (right-click on the desktop background: *Workspace Menu* -> *Tools* -> *Create Action*).

This opens the processing window “Create Action”:

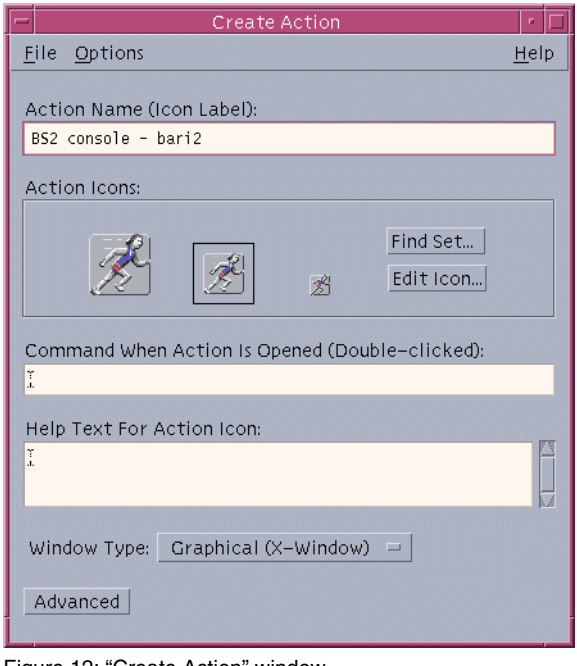


Figure 12: “Create Action” window

Three entries are important when creating an action:

– The name of the action (subtitle of the icon)
– The icon
– The command which is triggered when the icon is activated (with a double-click)

These three entries must be entered in that order in the fields of the window *Create Action*.

Enter the name of the icon in the first input line *Action Name (Icon Label)*. Use a name which will enable you to clearly identify the action, for example, “BS2000 Console”, “BS2000 Dialog” or “Solaris Shell – Server sx150part2”.

Select the appropriate icon from the section *Action Icons*. Click on *Find Set…* . This opens a new window for selection:

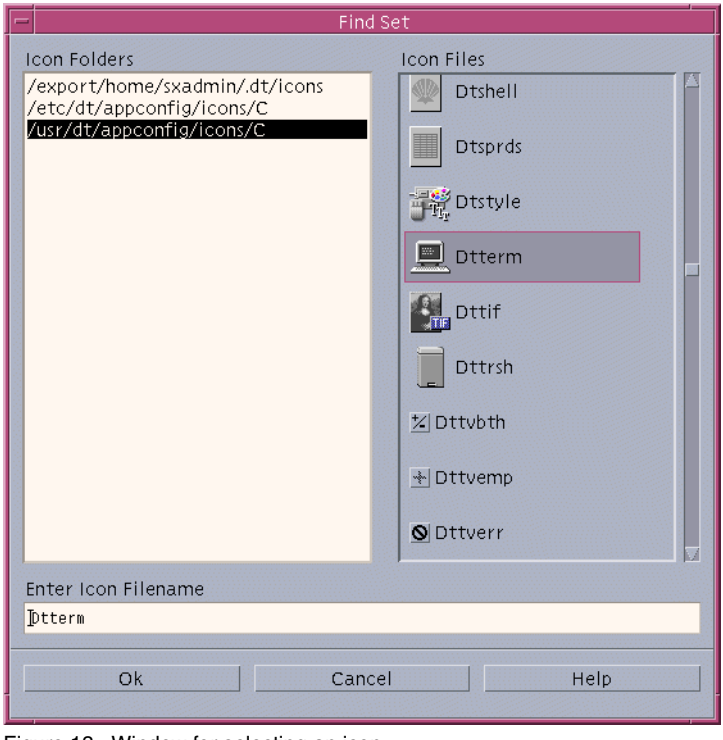


Figure 13: Window for selecting an icon

All the icons available on the SMC are in the directory `/usr/dt/appconfig/icons/C`.

Select this line with a double-click. A selection list of all available icons then appears in the right-hand side of the window.

For this example of accessing a BS2000 console, select the icon *Dtterm*, since terminal emulation is to be started on the SMC with this action.

Confirm your selection with *OK*.

After returning to the main window, enter the actual command. Do this in the line *Command when Action is Opened (Double-clicked)*.

Example

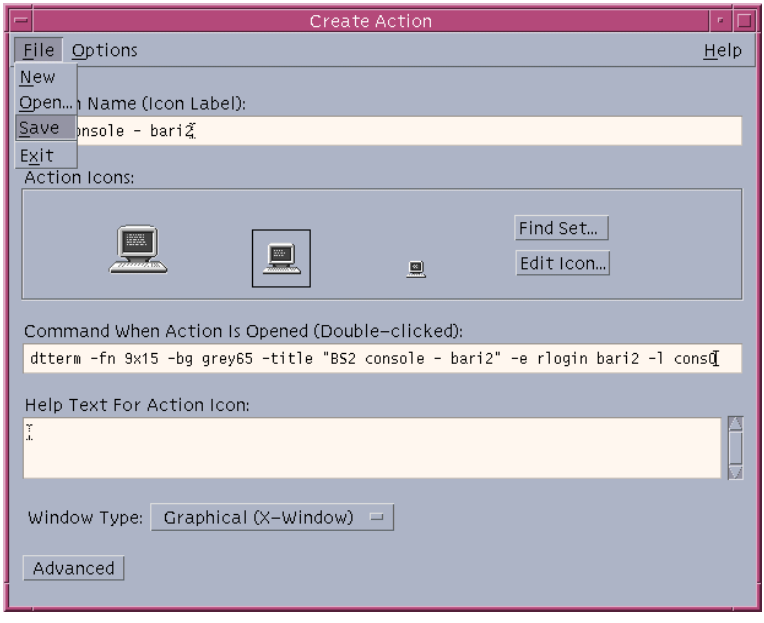


Figure 14: Example for a command in the “Create Action” window

In the example for a BS2000 console, the command consists of calling up the terminal emulation dtterm with parameters for the character set, the window title, the color settings for the console and a command which is executed in the generated window. These commands and parameters are explained in detail in the following sections.

When the command has been entered, the generated action must be saved. To do this, call *Save* from the *File*> menu. The action is then saved in the home directory of the current login. This is confirmed with an appropriate message.

Finally, the action which has just been created is integrated into the CDE interface.

The following options are available for this:

- Store the action directly on the desktop

  After the file manager has been opened with the home directory, you can drag and drop the action which is there to copy it directly onto the desktop.

- Integrate the action into the CDE control panel

  First create a new button in the CDE control panel to do this. Right-click on the position at which the button is to be added. Select *Add Icon* from the context menu which is displayed. An empty button is then created.

  The button is assigned the action dragged onto it from the opened file manager with the home directory.

  If the button which has just been created is to be extended to include a menu (like most other buttons on the CDE control panel), right-click on it to call the context menu again and select *Add Subpanel*. A submenu is then displayed at the top of the checkbox with the available action and an empty menu item (labeled "Install Icon"). Fill this empty menu item by dragging and dropping the relevant action.

3.3.1 Parameters for configuring an action for a dtterm terminal emulation

The following actions for Solaris shell (not on entry-level models), BS2000 console and BS2000 dialog are based on a dtterm terminal emulation call. This makes a window available for actual access via further commands. Configuring a dtterm window is a very flexible process and we will therefore first explain some of the possible parameters concerned.

The terminal emulation is always called up by the command `dtterm`. If the path variable has not been set correctly, it may be necessary to specify the absolute path `/usr/dt/bin/dtterm`.

Parameters can be specified additively:

- Assign a window title with `-title "<title text>"`, e.g. `-title "Solaris Shell - Server SX150ABC"` or `-title "BS2000 Console"`.
- Select a character set with `-fn <font name>`, e.g. `-fn 9x15`.

  All fonts which are installed can be determined with the command `xlsfonts`.
- Specify the terminal type with `-tn <terminal type>`, e.g. `-tn bs2console`.

  Not only the previous color scheme, with output of the messages in a yellow color, but also a color scheme adapted to the CDE, can be used when calling the console distribution program KVP for the BS2000 console. Here normal messages and inputs are output in the foreground color (black), emergency messages and questions are output as before in red, and KVP messages are underlined.
  The terminal type `bs2console` must be set for using these color schemes.

- Select a background color with `-bg <Name_of_background_color>`, e.g. `-bg grey65`.
- This is particularly important with the BS2000 console if the terminal type `bs2console` is not set, since the called BS2000 KVP program outputs the messages in yellow.

  All colors that can be selected are listed in the file `/usr/openwin/lib/X11/rgb.txt`.

  When selecting a color, ensure that all outputs remain legible.

  The following colors are recommended for the BS2000 console, in addition to various grays (grey65...70, DarkGrey): tan2, burlywood3, DarkKhaki, CadetBlue, PeachPuff3, NavajoWhite3, SteelBlue2.

The general standard recommendation is the terminal type `bs2console` without any special background color being specified.

3.3.2 Solaris shell (not on entry-level models)

To create a Solaris shell access to a partition, the following command must be entered when creating the action if the Secure Shell is not used:

```
dtterm -e telnet <server name of the Solaris partition>
```

If the Secure Shell is used, the following command must be entered when creating the action:

```
dtterm -e ssh <server name of the Solaris partition>
```

The call of the terminal emulation dtterm can be extended as described above to include parameters for assigning a title text and selecting a character set or a background color.

Example without using the Secure Shell

```
dtterm -fn 9x15 -bg white -title "Solaris Shell - Server SX-ABC"
-e telnet sx-abc.
```

Example using the Secure Shell

```
dtterm -fn 9x15 -bg white -title "Solaris Shell - Server SX-ABC"
-e ssh sx-abc.
```

3.3.3 BS2000 console

The ID `cons0` mentioned in this section represents a predefined KVP ID. Here the relevant KVP ID must be entered, according to the desired IPL console mnemonics (for this see page 164).

SX servers without entry-level models

To create BS2000 console access to a partition, the following command must be entered when creating the action if the Secure Shell is not used:

```
dtterm -tn bs2console -e rlogin <server name of BS2000 partition> -l cons0
```

If the Secure Shell is used, the following command must be entered when creating the action:

```
dtterm -tn bs2console -e ssh <server name of BS2000 partition> -l cons0
```

The call to the terminal emulation dtterm can be extended as described above to include parameters for assigning a title text and selecting a character set or a background color.

Example without using the Secure Shell

```
dtterm -fn 9x15 -tn bs2console -title "BS2000 console SX-BS2"
-e rlogin sx-bs2 -l cons0
```

Example using the Secure Shell

```
dtterm -fn 9x15 -tn bs2console -title "BS2000 console SX-BS2"
-e ssh sx-bs2 -l cons0
```

SX server entry-level models with the local console

To create a BS2000 dialog access to a partition, the following command must be entered when creating the action:

```
dtterm -fn <font> -title "BS2000 console - <servername>" -tn bs2console -e sh
-c "exec login cons0"
```

Example

```
dtterm -fn 9x15 -title "BS2000 console - SX100" -tn bs2console -e sh -c
"exec login cons0"
```

3.3.4 BS2000 dialog

SX servers without entry-level models

To create BS2000 dialog access to a partition, the following command must be entered when creating the action if the Secure Shell is not used:

```
dtterm -e rlogin <server name of the BS2000 partition> -l em9750
```

If the Secure Shell is used, the following command must be entered when creating the action:

```
dtterm -e ssh <server name of the BS2000 partition> -l em9750
```

The call to the terminal emulation dtterm can be extended as described above to include parameters for assigning a title text and selecting a character set.

Example without using the Secure Shell

```
dtterm -fn 9x15 -title "BS2000 dialog" -e rlogin sx-bs2 -l em9750
```

Example using the Secure Shell

```
dtterm -fn 9x15 -title "BS2000 dialog" -e ssh sx-bs2 -l em9750
```

Details of setting up console accesses to the guest systems of a VM2000 system are provided in the section "Operating the guest systems using operator terminals" in the "VM2000 (BS2000/OSD)" [14] manual.

SX server entry-level models with local console

To create BS2000 dialog access to a partition, the following command must be entered when creating the action:

```
dtterm -e sh -c "exec login em9750"
```

Example

```
dtterm -fn 9x15 -title "BS2000 dialog - SX100" -e sh -c "exec login
em9750"
```

3.3.5 PRIMEPOWER ServerView (BS2000 system)

SX server (not entry-level models)

A CDE action can also be created to call PRIMEPOWER ServerView as an application. The call should be made in the System Management Console.

When creating the action, select the icon “WSA” instead of the icon “Dtterm”.

The command to be entered should then be:

```
/opt/SMAW/bin/wsa `uname -n`
```

The command locally calls the PRIMEPOWER ServerView-application of the SMC.

SX server entry-level models with local console

To call PRIMEPOWER ServerView as an application in an entry server, you must call the PRIMEPOWER ServerView program directly. Here the call is performed in the X2000 carrier system.

The following command must be entered in the CDE action:

```
/opt/SMAW/bin/wsa 'uname -n'
```

3.3.6 Machine Administration Menu (for entry-level models only)

In this case the functions for hardware administration, unlike those for SX servers with SMC, are not integrated directly in the CDE interface. To call the machine administration menu (see section “Displaying the configuration” on page 81) a further CDE action must therefore be created for the entry-level models in the SX series. The machine administration menu requires root rights, which is why the ID `madmin` is created with corresponding assignment of rights. The ID `madmin` allows direct access to the relevant function.

The following command must be entered in the CDE action:

```
dtterm -e sh -c "exec login madmin"
```

In this case the calling of the terminal emulation can be supplemented as mentioned above by parameters for assigning a title text and for selecting a character set.

Example

```
dtterm -fn 9x15 -title "MAdmin - SX100" -e sh -c "exec login madmin"
```

3.4 Calling terminal instances

The desktop generated in the previous section can have the following appearance:

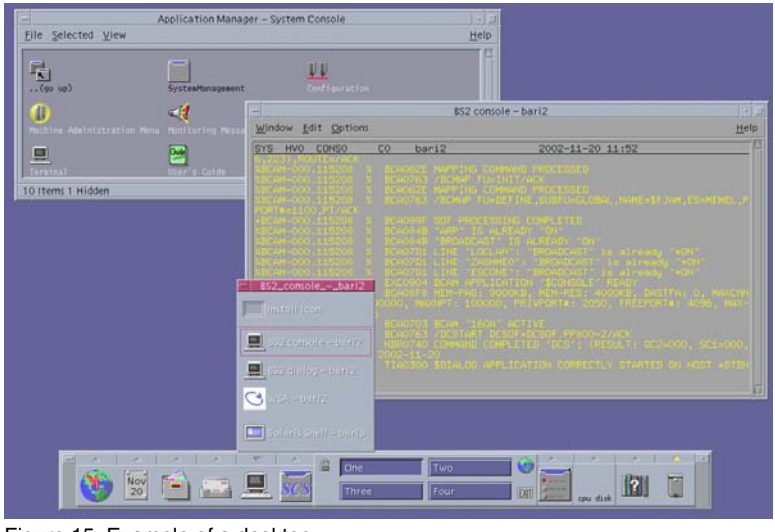


Figure 15: Example of a desktop

The generated actions (e.g. *BS2000 console*) are called either by clicking on the button in the CDE control panel or by activating the submenu of this button (click on the small arrow at the top edge of the icon) and the clicking on the relevant entry.

When the BS2000 console, BS2000 dialog and Machine Administration Menu are called, authorization is needed.

When using the password mechanism, the passwords which must be entered are those of the relevant KVP ID (BS2000 console), the em9750 ID (BS2000 dialog) and the madmin ID (for the Machine Administration Menu), respectively. When using the Secure Shell with a key not protected by a pass phrase, no further specification is necessary at this place.

When using the Secure Shell with a key protected by a pass phrase the pass phrase must be entered.

The windows which are opened are closed automatically by stopping the application running in them. BS2000 consoles are stopped by entering `::C` or CTRL D . A BS2000 dialog is stopped by logging the dialog off and then pressing the F10 key and leaving the em9750 emulation (with Exit). Terminate the Machine Administration Menu using the *q* function (for Quit).

The windows can also be closed by clicking on the top-left corner of the window and selecting the action *Close* from the context menu.

If windows are opened during the current CDE session and the session is terminated with EXIT, these windows will automatically be restarted when you next log in to the CDE interface.

4 Functions of the System Management Console

A PRIMEPOWER250 (up to and including SX140 a PRIMESTATION) is used on SX servers (with the exception of entry-level models) as the System Management Console (SMC):

- The SMC checks the hardware configuration and the operating status of the SX server.
- The SMC partitions the resources and thus enables the processor and memory capacities of the SX server to be shared.
- The SMC supports partition-specific console displays.
- The SMC supports a power supply scheduling system for switching the SX server or individual partitions on it on and off at specific times.
- The DVD/CD-ROM drive of the SMC can be used across partitions.
- In this way, operating systems and applications can be installed in every partition of the SX server.
- The DAT drive of the SMC can be used across partitions (but usually only by service technicians).
- On every partition of the SX server, the time is synchronized with the time of the SMC via the network time protocol (NTP).
- The SMC monitors the entire hardware of the SX server.
- If an error is detected, the relevant information is displayed on the SMC. The system administrator can optionally be notified by e-mail.
- The CDE interface (CDE = Common Desktop Environment) of the SMC allows access to PRIMEPOWER ServerView (see section “Starting PRIMEPOWER ServerView Suite” on page 196) and to BS2000 operation facilities (console, dialog; see section “Calling terminal instances” on page 40).

This manual only describes functions which are absolutely necessary for operating the SX server. Additional information is described in the latest version of “System Console Software User’s Guide (SCS)” [7].

4.1 User groups and logins

The System Console Software supports a graded system of rights to manage the hardware functions of the SX server.

The following sections describe how to set up logins for the various administrator roles (server administrator, partition administrator, BS2000 or Solaris administrator, and also administrator of PRIMEPOWER ServerView) with PRIMEPOWER ServerView and the System Console Software (SCS). It is also possible to combine multiple administrator roles in one user ID.
Both SCS and PRIMEPOWER ServerView require root authorization to perform these setup processes.

As of PRIMEPOWER ServerView V2.2B access to applications in PRIMEPOWER ServerView and access to nodes of the administration domain can be defined selectively for a PRIMEPOWER ServerView administrator via a differentiated assignment of rights. Details on this are provided in the section “Privilege concept with Role-Based Access Control” on page 201ff.

System administrators work with the System Management Console to manage the server. In addition, separate administrators can be defined for individual partitions that only have access to the assigned partition. To manage BS2000 or Solaris in a partition, it is also possible to define BS2000 or Solaris administrators who do not have rights for managing the hardware of the server.

This section describes how to handle user logins for the following operating staff:

- Server administrators
- Partition administrators
- BS2000 or Solaris administrators
- PRIMEPOWER ServerView administrators

The SX server is shipped ready with the following user logins for managing the server from the SMC:

  – A server administrator login *sxadmin*
  – A partition administrator login *bs2admin* for all the BS2000 partitions present
  – A partition administrator login *soladmin* for all the Solaris partitions that may be present

  It is recommended that you use these logins to manage the server.

The functionality of the user groups *cladmin* and *clmon* and the partition administration groups *p0grp*, *p1grp*, etc. described in the sections below is determined by SCS and described in the following table. The user groups mentioned are set in the factory.

	User group			
	cladmin	***clmon***		***cemainte***
Operation		**Adm(1)**	**Non-Adm(1)**	
Reference to monitoring messages and configuration dialog boxes	X	X	X	X
System power-on indication	X	-	-	X
Power-on instruction, shutdown instruction, and dump switch instruction to the partition	X	X	-	X
Settings for Multiple-Partition Configuration	X	-	-	-
R/W (read/write) monitoring of the OS console screen (3)	X	X	-	X
R/O (read-only) monitoring of the OS console screen (4)	X	X	X	X
Saving crash dump data	X	X	-	-
Scheduling automatic mainframe operation	X	-	-	-
Viewing the automatic operation schedule of a mainframe	X	X	X	X
Maintenance operation (2)	X	-	-	X

Table 1: Functionality of the administrator user group in the SCS

Comments

(1) The “Adm” column designates users who belong to the user group *clmon* and a partition administration group. The “Non-Adm” column designates users who belong to the user group *clmon* but to no partition administration group.

(2) Maintenance functions are offered via the System Console Machine Administration. The functions of the Machine Administration are normally used by hardware maintenance engineers. But system administrators who belong to the user group *cladmin* can use these functions to check the hardware status.

(3) RC2000 makes read/write monitoring of a partition available for a user.

(4) RC2000 makes read monitoring of a partition available for up to 14 users.

4.1.1 Server administrator

The administrator of the server manages the entire server and the system console.

The administrator has root access to the system console. This root authorization allows the administrator to use all available functions of the SCS. For basic security reasons, however, only the following actions should be performed:

– Configuring the system console (generally this is not necessary since the console has been configured ex works)
– Adding, modifying and deleting partition administrators (where required)
– Configuring the SMC as an installation server
– Configuring and modifying server names for partitions

A login with the name *sxadmin* is configured by default for the server administrator. This login is a member of the following user groups:

– *cladmin* (a group defined by the System Console Software with administration authorization for the server).
Users in this group have administrative rights for all partitions of the server.

– *wsauser* as secondary user group (a group for administering PRIMEPOWER ServerView defined by PRIMEPOWER ServerView)

In the as-supplied status the *sxadmin* ID has read/write access for all applications of PRIMEPOWER ServerView and for all nodes of the administration domain.

To configure further server administrator logins, the following actions are necessary:

1. Set up the login with PRIMEPOWER ServerView in the user group *cladmin*:
   a) Start PRIMEPOWER ServerView (see the section “Starting PRIMEPOWER ServerView Suite” on page 196)
   b) Select *Applications* -> *Users* from the menu bar
   c) Select *Users* -> *Create* from the menu bar

d) Create a new user (e.g. user name *sxadmin1*) as a member of the user group *cladmin*:

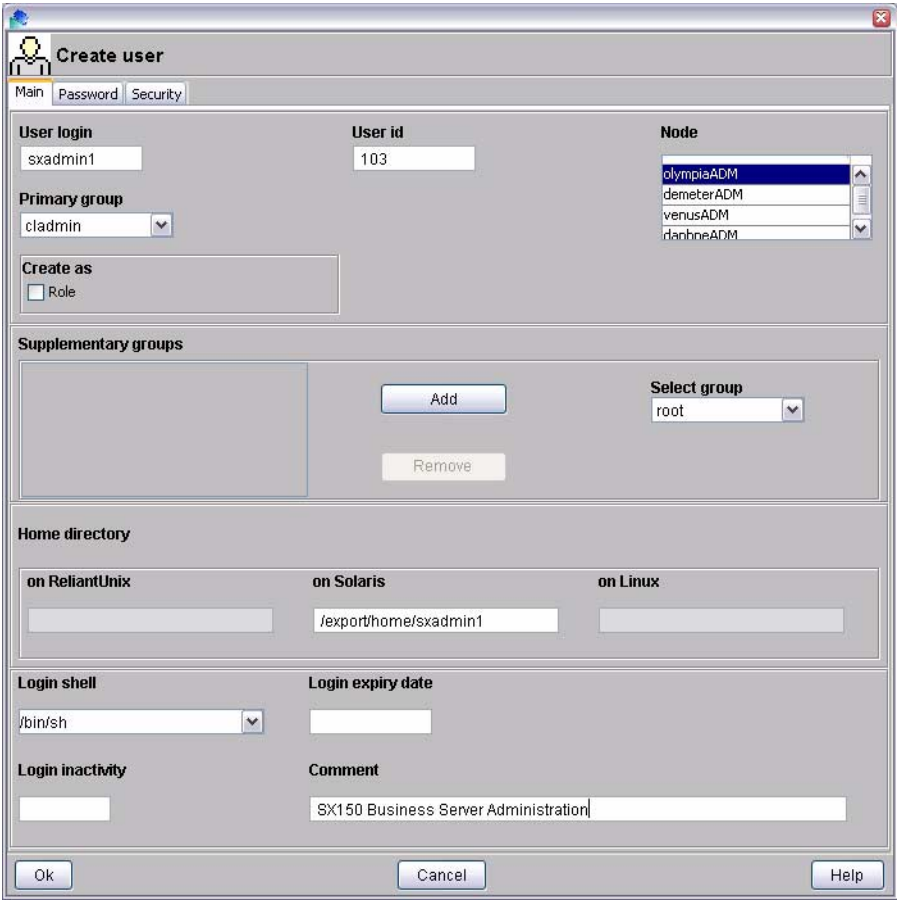


Figure 16: PRIMEPOWER ServerView window: “Create user” (cladmin)

Make the following entries here:

– Enter the user name *sxadmin1* under “User login” (the user id is assigned automatically)
– Select the SMC as the “Node”
– Select *cladmin* for “Primary group”

– No entries are required in the “Supplementary groups” section for someone who is exclusively an SX server administrator.
If PRIMEPOWER ServerView is also to be operated in write mode under this user ID, *wsauser* must be selected as the secondary user group. The secondary user group *wsaruser* must be selected for operation in read mode. Membership in one of the two user groups *wsauser* or *wsaruser* also causes this user process to run in PRIMEPOWER ServerView with root authorization.
– Select a login shell.
– A comment can be specified if necessary.

The home directory in Solaris (in this example `/export/home/sxadmin1`) is created automatically.

e) As of PRIMEPOWER ServerView V2.2B the access rights of this user ID can be defined more specifically with regard to access to applications in PRIMEPOWER ServerView and access to nodes in the administration domain. Further details are provided in the section “Privilege concept with Role-Based Access Control” on page 201ff.

2. Set up the SCS user interface (*Terminal* in the Application Manager) for the server administrator using the following command (which must be performed with root authorization):

```
/opt/FJSVscs1/bin/scslowneradd -a <username>
```

The option `-a` here stands for “administrator”.

4.1.2 Partition administrators

Partition administrators also use the interface of the System Console Software to manage the hardware of the partition. They have access to the hardware console of the partition assigned to them and are authorized to switch the partition on/off. They do not have rights to any other partitions.

Two partition administrator logins are configured by default for the two platform types:

- *bs2admin* for all BS2000 partitions present
- *soladmin* for all Solaris partitions that may be present

A login is configured for the partition administrator. This login is a member of the following SMC user groups:

- *clmon* (this is a group with monitoring rights for all partitions of the server)
- In all partition administration groups which belong to the platform type concerned (each group has administration rights for the partition assigned to it)

In addition the login is a member of the secondary user group *wsauser* which provides authorization to administer PRIMEPOWER ServerView.

Partition administration groups correspond one-to-one to server partitions. A user registered in this group has the rights needed for managing the partition and can carry out input and output operations on the RC2000 console of the partition.

In the as-supplied status a partition administrator login has read/write access to all applications of PRIMEPOWER ServerView of the nodes on the platform type concerned.

To configure further partition administrator logins, the following actions are necessary:

1. Configure the login with PRIMEPOWER ServerView in the user group *clmon*:
   a) Start PRIMEPOWER ServerView (see the section “Starting PRIMEPOWER ServerView Suite” on page 196)
   b) Select *Applications* -> *Users* from the menu bar
   c) Select *Users* -> *Create* from the menu bar

d) Create a new user (e.g. user name *soladmin2*) as a member of the user group *clmon*:

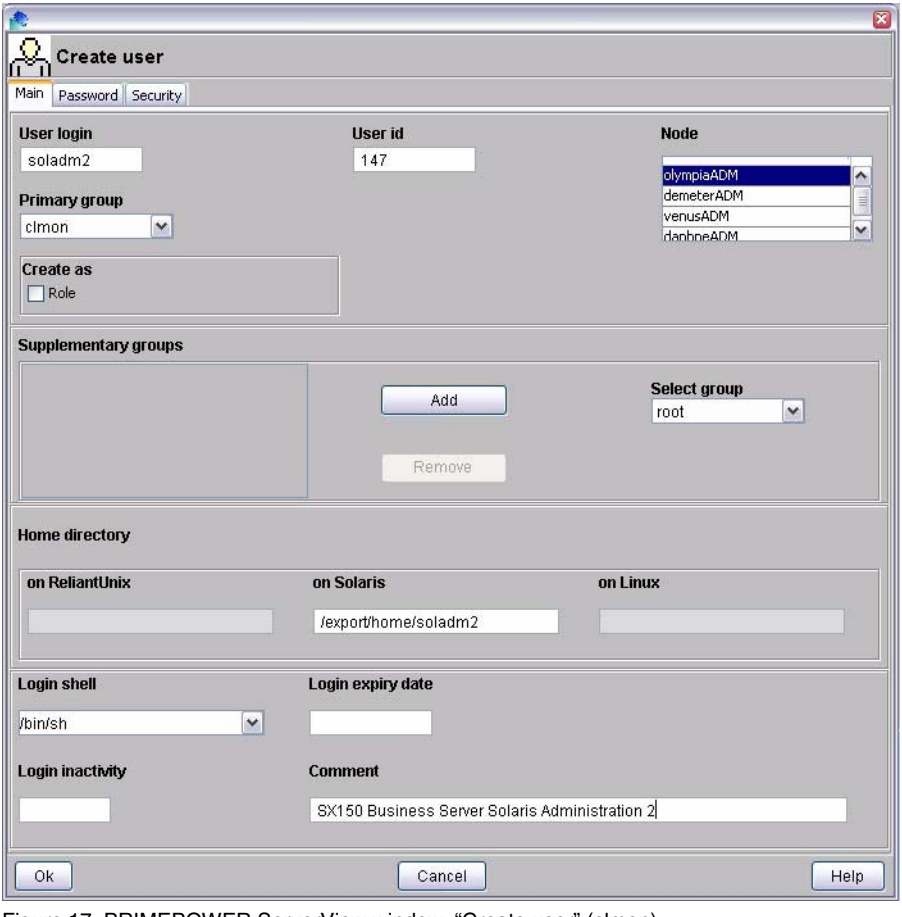


Figure 17: PRIMEPOWER ServerView window: “Create user” (clmon)

No entries are required in the “Supplementary groups” section for someone who is exclusively an SX server administrator.
If PRIMEPOWER ServerView is also to be operated in write mode under this user ID, *wsauser* must be selected as the secondary user group. The secondary user group *wsaruser* must be selected for operation in read mode. Membership in one of the two user groups *wsauser* or *wsaruser* also causes this user process to run in PRIMEPOWER ServerView with root authorization.
As of PRIMEPOWER ServerView V2.2B the access rights of this user ID can be defined more specifically with regard to access to applications in PRIMEPOWER ServerView and access to nodes of the administration domain. Details on this can be found in the section “Privilege concept with Role-Based Access Control” on page 201ff.

2. If necessary, configure a further partition-specific user group with PRIMEPOWER ServerView, e.g. *part1grp*.

   User groups suitable for this have already been configured by default with the name *p0grp*, *p1grp*, etc. and are used for the partition administrators *bs2admin* and *soladmin*.

   These groups can be used when configuring further partition administrators. Alternatively, further user groups can also be created for this.

   Click on the *Groups* tab and select *Groups* -> *Create* from the menu bar:

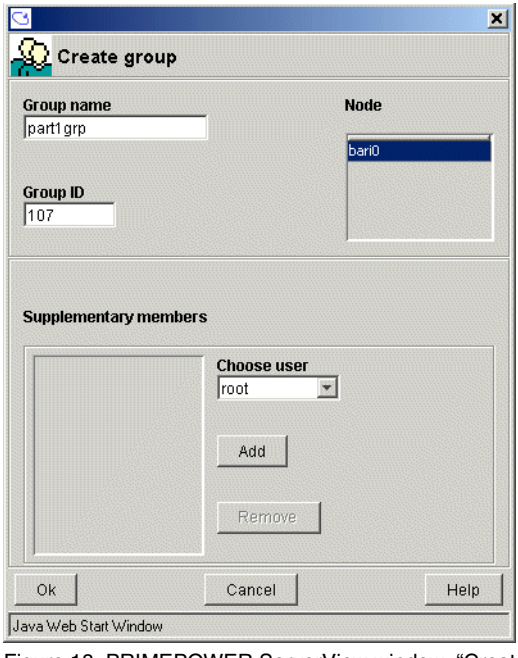


Figure 18: PRIMEPOWER ServerView window: “Create group”

3. Set up the SCS user interface (*Terminal* in the Application Manager) for the partition administrator using the following command (which must be executed with root authorization):

   ```
   /opt/FJSVscsl/bin/scslowneradd -h <server name of partition>:<partition administration group> <username>
   ```

   The `-h` option here stands for partition administrator.

4.1.3 BS2000 or Solaris administrators

To manage the operating systems of individual partitions, it may be useful to configure user IDs which do not have extended rights relating to the management of the hardware of the server (like server administrators or partition administrators).

These user IDs must however be able to read the data of the RC2000 consoles of the partitions.

These IDs are also suitable for the administrator for preconfiguring terminals to access the partitions (see also section “Preconfiguring terminals” on page 32).

The following actions are needed to configure a user ID of this type:

1. Set up the login with PRIMEPOWER ServerView in the user group *clmon*:
   a) Start PRIMEPOWER ServerView (see the section “Starting PRIMEPOWER ServerView Suite” on page 196)
   b) Select the *Users* application
   c) Select *Users* -> *Create* from the menu bar
   d) Create a new user (e.g. user name *bs2adm1*) as a member of the user group *clmon*
      No entries are required in the “Supplementary groups” section for someone who is exclusively an SX server administrator.
      If PRIMEPOWER ServerView is also to be operated in write mode under this user ID, *wsauser* must be selected as the secondary user group. The secondary user group *wsaruser* must be selected for operation in read mode. Membership in one of the two user groups *wsauser* or *wsaruser* also causes this user process to run in PRIMEPOWER ServerView with root authorization.
      As of PRIMEPOWER ServerView V2.2B the access rights of this user ID can be defined more specifically with regard to access to applications in PRIMEPOWER ServerView and access to nodes of the administration domain. Details on this can be found in the section “Privilege concept with Role-Based Access Control” on page 201ff.

2. Set up the SCS user interface (*Terminal* in the Application Manager) for the user ID using the following command (which must be executed with root authorization):

   ```
   /opt/FJSVscsl/bin/scslowneradd -h <server name_of_partition>:clmon <user name>
   ```

   In the next step you must remove the assignment of administration rights to a partition which was needed temporarily to set up the SCS user interface. Proceed as follows:

3. Remove partition administration rights

   The entry generated by the command `scslowneradd` in the file `/etc/FJSVclowners` must be removed using an editor (e.g. vi).

   The line to be deleted comprises an entry with the following format:

   ```
   clmon:<server name of partition>.
   ```

4.1.4 Administration of PRIMEPOWER ServerView

The actions described under item 1 are required to set up a user ID which has no extended rights with regard to the hardware administration of the server and can be operated under PRIMEPOWER ServerView.

As of PRIMEPOWER ServerView Suite V2.2B it is possible to define the access rights of this user ID with regard to access to applications in PRIMEPOWER ServerView and the access to nodes of the administration domain more precisely (see item 2 on page 55). The information required for this is provided in the section “Privilege concept with Role-Based Access Control” on page 201ff.

1. Setting up the user ID with PRIMEPOWER ServerView in the primary user group *other* or in a user group defined by the user (a user group can be generated in the *Groups* tab in the *Users* group by clicking on the *Groups* button):

   a) Start PRIMEPOWER ServerView (see the section “Starting PRIMEPOWER ServerView Suite” on page 196)

   b) Select the *Users* application.

   c) Select *Users* -> *Create* in the menu bar.

d) Create the new user (e.g. user name *pwsvadm*)

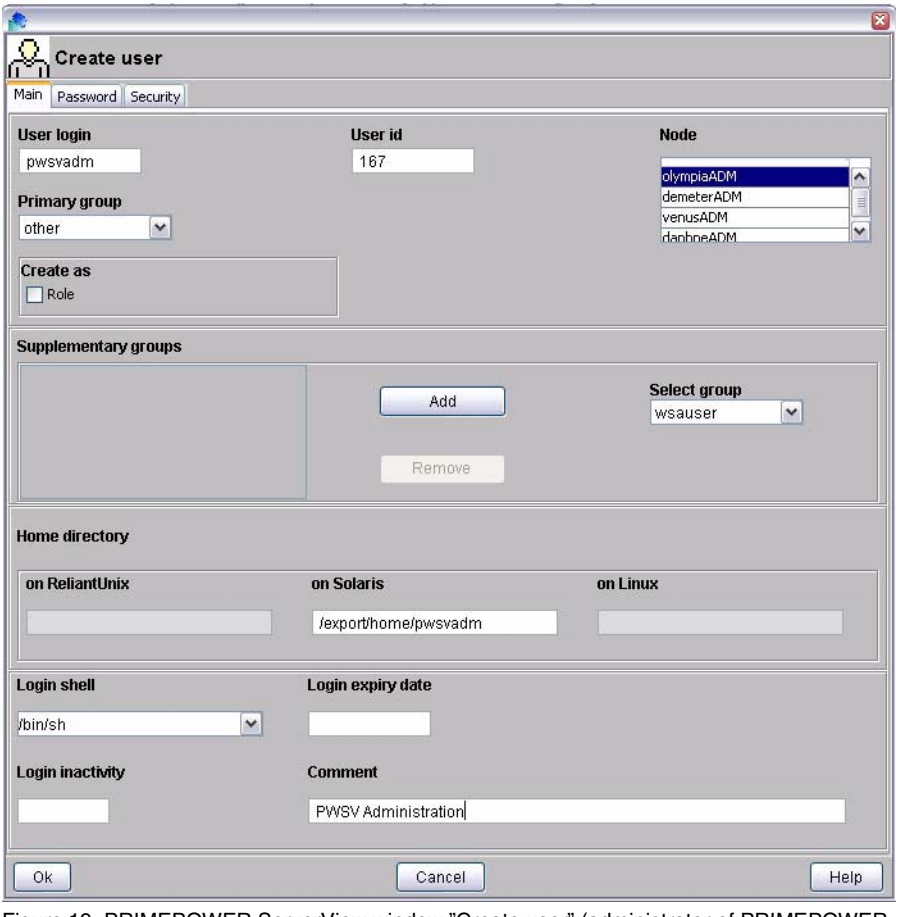


Figure 19: PRIMEPOWER ServerView window:"Create user" (administrator of PRIMEPOWER ServerView)

As the user is not to be allocated special SCS privileges, the user must be assigned as a member of the primary user group *other*. The SMC must be selected as the node.
To permit PRIMEPOWER ServerView to be operated in write mode under this ID at a later time the user ID must be entered in the secondary user group *wsauser* which is defined for this purpose. If you wish to operate PRIMEPOWER ServerView only in read mode, the secondary user group *wsaruser* must be selected. Membership in one of the two user groups *wsauser* or *wsaruser* ensures that this user group runs within PRIMEPOWER ServerView with root authorization
To do this you must select the secondary user group from the window and add it using the *Add* button.

2. After this it may be necessary to adjust the access rights to the applications of PRIMEPOWER ServerView and the nodes of the administration domain.

   In the following cases such a user ID is automatically assigned the full access rights to all available applications of PRIMEPOWER ServerView and to all nodes of the administration domain:

   - Use of PRIMEPOWER ServerView Suite Version < V2.2B
   - When the user ID is created the feature Role Based Access Control (RBAC) is not activated in PRIMEPOWER ServerView.

   If the RBAC feature is activated in PRIMEPOWER ServerView when the user ID is created, the user ID is not assigned access rights to the PRIMEPOWER ServerView applications or the nodes of the application domain. These rights must then be set accordingly.

   The interface for checking, setting, and modifying the RBAC access rights is described in the section “Privilege concept with Role-Based Access Control” on page 201ff.

4.2 System console software (SCS)

The system console menu used to activate the functions looks like this:

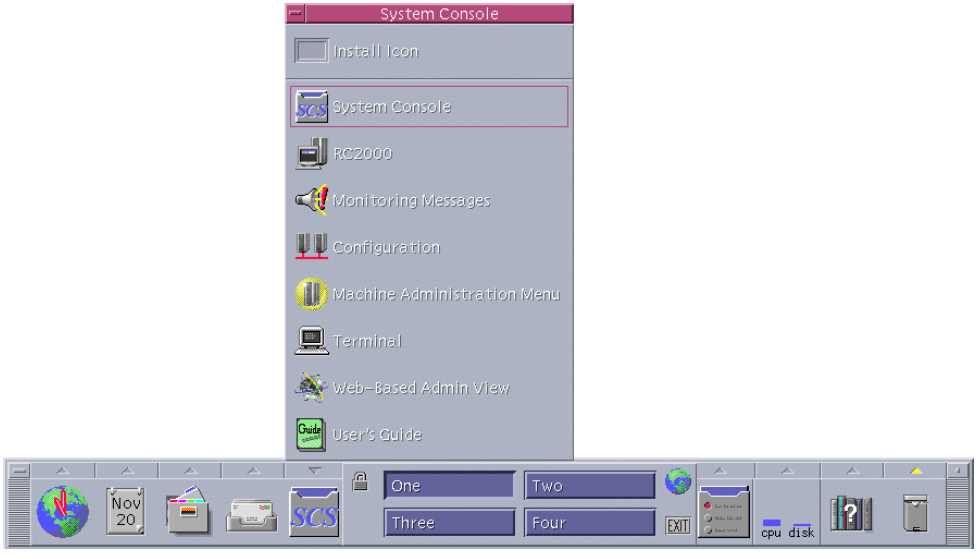


Figure 20: System console menu

Click the system console icon in the toolbar to open the menu.

The table below describes the functions of the tools provided on the system console:

Function	**Description**
System Console	Menu with the functions provided by the system console. Is automatically started after logging in.
RC2000	Shows a host browser via which the console windows of the server can be opened. Is automatically started after logging in.
Monitoring Messages	Shows server errors, for instance, which are acknowledged by the system console. Is automatically started after logging in.
Configuration	Shows the partition structure of the server. Is automatically started after logging in.
Machine Administration Menu	Opens the system administration window of the system console.
Terminal	Allows commands to be executed on the system console.
Web-Based Admin View	This function is currently not used.
User's Guide	Shows the user's guide to the System Console Software.

If the functions provided by the system console were closed before logging out, they are not automatically displayed when you log into the system again. If this happens, click on the relevant icon in the toolbar or in the Application Manager to start a function.

If the Application Manager window was minimized before the last logout, it does not appear maximized when you log into the system again.

4.3 Functions of the System Console Software (SCS)

This section describes the SCS functions *Machine Administration Menu*, *RC2000* and *Monitoring Messages*.

4.3.1 Machine Administration Menu

The *System Console Machine Administration Menu* enables the management and servicing of the system hardware.

This menu is available for administrators of the system console or service engineers.

This function is called up by selecting *Machine Administration Menu* from the system console menu (see figure 20 on page 56) or by double-clicking on the *Machine Administration Menu* icon in the Application Manager (see figure 11 on page 30):

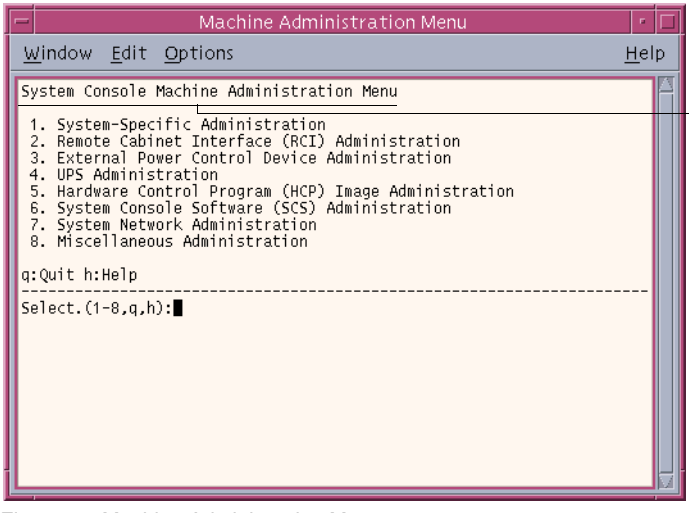


Figure 21: Machine Administration Menu

The menu name does not appear in the frame but as the first line in the text window.

4.3.1.1 Functions for switching the server on/off

This section describes how the power supply of the server is handled via the system console.

The following procedure describes how to access the *System/Partition Power Administration Menu*:

1. Select *System Specific Administration*:

   ```
   1 <RETURN>
   ```

   All available servers are offered for selection.

   Example

   ```
   System-Specific Administration
   Segment ID#1

   This is a list of the servers.
   A menu for each server can be activated for units containing a
   description of server names.

    No Server name
   --- ----------------
   001 machine0

   q:Quit b:Back to previous menu t:Go to top menu h:Help
   ------------------------------------------------------------------
   Select.(n,q,b,t,h):
   ```

2. Select the required server.

   Example

   ```
   1 <RETURN>
   ```

   The *System-Specific Administration* menu is opened for the selected server (in this example `machine0` of the SX150 server):

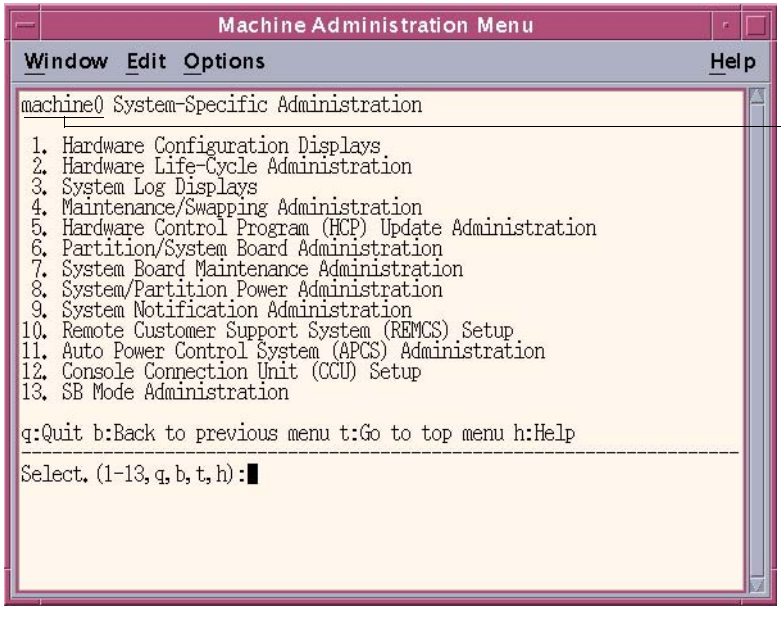

Machine Administration Menu
Window Edit Options Help
machine0 System-Specific Administration
1. Hardware Configuration Displays
2. Hardware Life-Cycle Administration
3. System Log Displays
4. Maintenance/Swapping Administration
5. Hardware Control Program (HCP) Update Administration
6. Partition/System Board Administration
7. System Board Maintenance Administration
8. System/Partition Power Administration
9. System Notification Administration
10. Remote Customer Support System (REMCS) Setup
11. Auto Power Control System (APCS) Administration
12. Console Connection Unit (CCU) Setup
13. SB Mode Administration
q:Quit b:Back to previous menu t:Go to top menu h:Help
Select. (1-13, q, b, t, h):
Server

Figure 22: Machine Administration Menu: “System-Specific Administration”

3. Select *System/Partition Power Administration*:

   ```
   8 <Return>
   ```

   This opens the menu *System/Partition Power Administration* for the selected server (`machine0`):

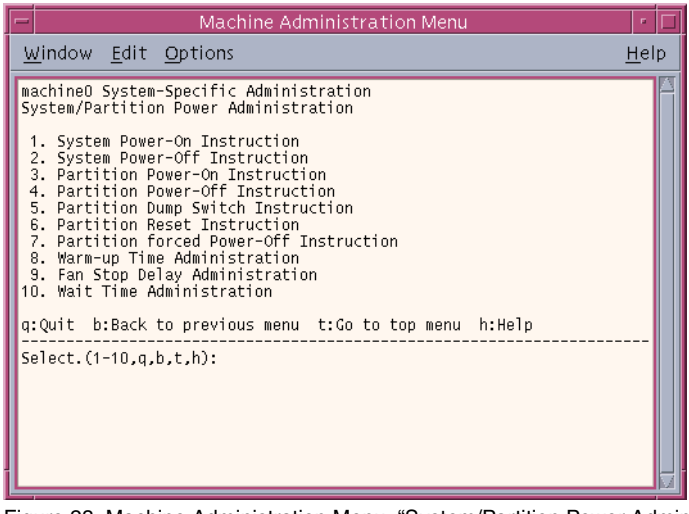

Machine Administration Menu
Window Edit Options Help
machine0 System-Specific Administration
System/Partition Power Administration
1. System Power-On Instruction
2. System Power-Off Instruction
3. Partition Power-On Instruction
4. Partition Power-Off Instruction
5. Partition Dump Switch Instruction
6. Partition Reset Instruction
7. Partition forced Power-Off Instruction
8. Warm-up Time Administration
9. Fan Stop Delay Administration
10. Wait Time Administration
q:Quit b:Back to previous menu t:Go to top menu h:Help
Select.(1-10,q,b,t,h):

Figure 23: Machine Administration Menu: “System/Partition Power Administration”

The *System/Partition Power Administration* menu contains the following functions:

1. System Power-On Instruction	Switches the server on
2. System Power-Off Instruction	Switches the server off
3. Partition Power-On Instruction	Switches a partition on
4. Partition Power-Off Instruction	Switches a partition off

WARNING!
The following menu items should only be used by a service engineer, otherwise the operation of the system can be disrupted:

5. Partition Dump Switch Instruction	A system crash is initiated. A dump is generated as a diagnostic document.
6. Partition Reset Instruction	Resets a partition
7. Partition forced Power-Off Instruction	Forced switching off of a partition
8. Warm-up Time Administration	Sets the warming-up time
9. Fan Stop Delay Instruction	Sets the stop delay of the fan
10. Wait Time Administration	Sets the wait time for switching on

Switching the entire server on

The function *System Power-On Instruction* switches the server on if it is switched off.

Switching on the server via this menu item has the same effect as powering on the server via the control panel on the front side of the SX server (see the SX1xx Operating Manual [2]).

1. Select the function *System Power-On Instruction* from the menu *System/Partition Power Administration*:

   ```
   1 <RETURN>
   ```

   The following screen output enables the status of the server power supply to be checked first:

   ```
   machine0 System-Specific Administration
   System Power-On Instruction


   System Power status     OFF


   Do you want to issue the power-on instruction
   to this system? (y:  yes)

   q:Quit  b:Back to previous menu  t:Go to top menu  h:Help
   ------------------------------------------------------------
   Select.(y,q,b,t,h):
   ```

   In this example, the server is switched off.

2. To switch the server on, enter:

   ```
   y <RETURN>
   ```

   If the server is already switched on (on status), the action is ignored.

Switching the entire server off

The function *System Power-Off Instruction* switches the server off if it is switched on.

1. Select the function *System Power-Off Instruction* from the menu *System/Partition Power Administration*:

   2 <RETURN>

   The following screen output enables the status of the server power supply to be checked first:

```
machine0 System-Specific Administration
System Power-Off Instruction

System Power status     ON


Do you want to issue the power-off instruction
to this system? (y:  yes)

q:Quit  b:Back to previous menu  t:Go to top menu  h:Help
------------------------------------------------------------
Select.(y,q,b,t,h):
```

   In this example, the server is switched on.

2. To switch the server off, enter:

   y <RETURN>

   If the server is already switched off (off status), the action is ignored.

Switching partitions on

The function *Partition Power-On Instruction* switches on one or more partitions.

Switching on a partition starts the operating system in the partition.

1. Select the function *Partition Power-On Instruction* from the menu *System/Partition Power Administration*:

   3 <RETURN>

   The following screen output shows the status of the individual partitions on the selected server.

   Example

```
machine0 System-Specific Administration
Partition Power-On Instruction

PID   Power status
--    ---
00    ON
01    OFF
02    OFF

Select the partitions to be powered on. (a:  All)
To specify multiple PIDs, separate with a comma (,).

q:Quit  b:Back to previous menu  t:Go to top menu  h:Help
------------------------------------------------------------
Select.(n,a,q,b,t,h):
```

   In this example, the partitions of the server machine0 with the PIDs 01 and 02 (PID = Partition ID) are switched off.

2. To switch the partitions on, enter the PID(s), separated by a comma.

   Example

   1,2 <RETURN>

   Entering a <RETURN> has the same effect in this example.

   If a partition has already been activated, the command for this partition is ignored.

Switching partitions off

The function *Partition Power-Off Instruction* powers off one or more partitions.

1. Select the function *Partition Power-Off Instruction* from the menu *System/Partition Power Administration*:

   ```
   4 <RETURN>
   ```

   The following screen output shows the status of the individual partitions on the required server.

   Example

   ```
   machine0 System-Specific Administration
   Partition Power-Off Instruction

   PID   Power status
   --    ---
   00    ON
   01    ON
   02    ON

   Select the partition to shutdown. (a:  All)
   To specify multiple PIDs, separate with a comma (,).

   q:Quit  b:Back to previous menu  t:Go to top menu  h:Help
   ------------------------------------------------------------
   Select.(n,a,q,b,t,h):
   ```

   In this example, all partitions of the server `machine0` are switched on.

2. To switch the partitions off, enter the PID(s), separated by a comma. In the following example, the partitions with the PIDs 00 and 01 are switched off:

   ```
   0,1 <RETURN>
   ```

   The following entry switches off all partitions:

   ```
   a <RETURN>
   ```

   If a partition has already been switched off, the command for this partition is ignored.

4.3.1.2 Switching the server on/off on a scheduled basis

The automatic power control system (APCS:) switches the server on or off automatically, on the basis of a series of on/off schedule entries. These entries form the system schedule.

Switching on/off thus affects all partitions of the server.

Switching on automatically starts the operating system of the partition if the mode selector of the system is in the *LOCK* position (normal mode) (see sections "Switching the entire server on" on page 62 and "Mode selector" in the SX1xx Operating Manual [2]). Switching the server off in this switch position shuts down the operating system. For BS2000/OSD partitions, this involves starting/shutting down the carrier system X2000.

For an automatic IPL (Initial Program Load) of BS2000 on switching on the server (see "Configuration of automatic IPL (G)" on page 215) or for an automatic shutdown of BS2000 (see "Evaluation of shutdown (X)" on page 216) on switching off the server, the relevant entries must be made in the KVP menu.

- Select *System-Specific Administration* from the *Machine Administration Menu* (see figure 21 on page 58):

  ```
  1 <RETURN>
  ```

- Select the required server.

► Select *Auto Power Control System (APCS) Administration* from *System-Specific Administration* (see figure 22 on page 60):

```
11 <RETURN>
```

This opens the *APCS Setup Menu*:

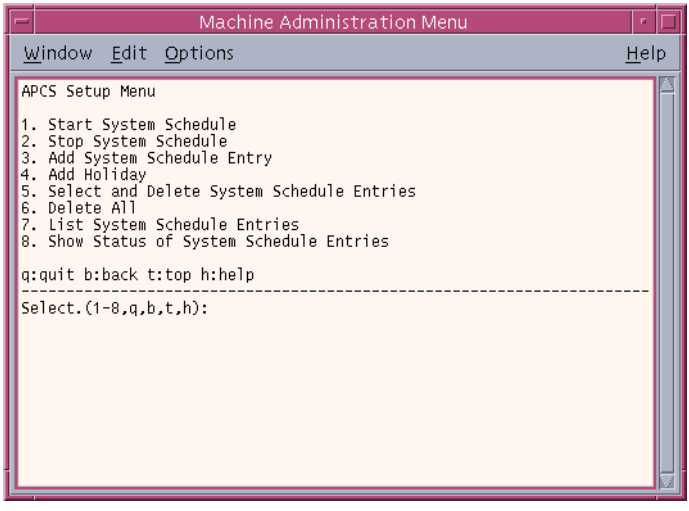

Machine Administration Menu
Window Edit Options Help
APCS Setup Menu
1. Start System Schedule
2. Stop System Schedule
3. Add System Schedule Entry
4. Add Holiday
5. Select and Delete System Schedule Entries
6. Delete All
7. List System Schedule Entries
8. Show Status of System Schedule Entries
q:quit b:back t:top h:help
Select.(1-8,q,b,t,h):

Figure 24: Machine Administration Menu: “APCS Setup Menu”

The following actions can be performed using this menu:

- Starting the system schedule
- Stopping the system schedule
- Adding an entry to the schedule and deleting an entry
- Adding a holiday
- Deleting a holiday
- Deleting the entire schedule
- Listing all schedule entries
- Showing the schedule status

To create or delete schedule entries and enable APCS operation, proceed as follows:

1. Select the function *Stop System Schedule* to stop the system schedule:

   ```
   2 <RETURN>
   ```

2. Select *Add System Schedule Entry* to add an entry:

   ```
   3 <RETURN>
   ```

   Follow the instructions for adding a schedule entry.

Examples

a) Setting the power on time:

```
Set Power On Time (Add)

Please set the automatic power on time.
Press the "RETURN" key if you do not wish to power on the system
automatically.

 Example)
   Power on at AM 8:00 :    0800
   Power on at PM 2:00 :    1400

q:quit b:back t:top
------------------------------------------------------------------------
Select.(HHMM,q,b,t):
```

Enter the four-digit time and press the Return key. Or just press the Return key if no power on time is to be set.

b) Setting the power off time:

```
Set Power Off Time (Add)

Please set the automatic power off time.
Press the "RETURN" key, if you do not wish to power off the system
automatically.

Example)
   Power off at  0:00 AM :  0000
   Power off at 11:00 PM :  2330

q:quit b:back t:top
------------------------------------------------------------------------
Select.(HHMM,q,b,t):
```

Enter the four-digit time and press the Return key. Or just press the Return key if no power off time is to be set.

c) Setting the schedule:

```
Schedule Setup (Add)

Please set the day or days to put into operation.

  .Specific Day
    Example) Feb. 1st, 2000 : 20000201

  .Specific days in this month
    Example) From 1st through 10th : 01-10

  .To repeat this for several months
    Example) From 1st through 10th in Feb.
                       through May : 01-10 -r 02-05

  .From a specific day through another specific day
    Example) From Feb. 1st through Jun. 10th : 0201-0610

  .Specific day of the week
     Sunday            : SUN
     Monday            : MON
     Tuesday           : TUE
     Wednesday         : WED
     Thursday          : THU
     Friday            : FRI
     Saturday          : SAT

    Example) Every Monday or Tuesday from Feb. through May :
                    MON,TUE -r 02-05

q:quit b:back t:top
--------------------------------------------------------------------------------
Select.(schedule,q,b,t):
```

Enter the schedule as for the above examples. Then press the Return key.

3. You can enter holidays with the function *Add Holiday*:

   4 <RETURN>

   Example

```
Add Holiday

Please set the day when schedule entry or entries are to be ignored.

Example)
    Feb. 1st, 2000 : 20000201


q:quit b:back t:top
------------------------------------------------------------------------
Please input.(YYMMDD,q,b,t):
```

   Enter the six-digit holiday date (YYMMDD). Then press the Return key.

4. To check the schedule entries, select the function *Show Status of System Schedule*:

   8 <RETURN>

   Example

```
STATUS : APCS has been stopped by operator
PRESENT   :  9/27(Fri)  2 14:51:43
POWER-OFF :  -
POWER-ON  :  -
OVER      :  -
SCHEDULE OF 7 days NEXT:
DATE                        TIME    FUNC    PROCEDURE
{END OF DATA}

press return key:
```

   Show Status of System Schedule only shows the data for a period of 7 days (beginning at the current time). To display a longer period, use the following `apcsset` command (`-L` Option):

   ```
   #/opt/FJSVapcs/sbin/apcsset -s machine0 -L 30 -f
   ```

   For details on the `apcsset` command, see "System Console Software User's Guide (SCS)" [7].

5. To delete schedule entries (including holidays), use the menu item *Select and Delete Entire System Schedule*:

   5 <RETURN>

6. Select the function *Start System Schedule* to start the system schedule:

   ```
   1 <RETURN>
   ```

7. Transfer the schedule to every partition:

   If the server is switched on while changes are being made to the schedule, these changes need to be passed to the console of every partition via the schedule update command:

   ```
   # /opt/FJSVapcs/sbin/apcsflush
   ```

   For further details on the apcsflush command, see "System Console Software User's Guide (SCS)" [7]. This command only transfers the schedule to the partition. The system is only affected if one of the setpoints specified in the schedule is reached.

Individual partitions cannot be switched on or off under time control. However, this functionality can be used via the processes described in the section below.

4.3.1.3 Switching partitions on/off on a time-driven basis

Time-driven commands

Time-driven execution of a command can be defined in the *Tasks* application of the PRIMEPOWER ServerView Suite. The *Tasks -> Create task* function opens a calendar window which provides a straightforward way of declaring a time scheme. The *Node* window enables you to select a node (in this application the SMC must be specified). In the *Command* window you can specify a single command or a script which is then executed with root authorization at the specified times.

The definitions are activated when they have been defined, i.e. the task has the *enabled* status. Clicking on the definition with the right mouse button and selecting the *De-/Activate* function deactivates or reactivates it.

The *Tasks* application is a generally usable, convenient encapsulation of the cron job which avoids errors. When a time scheme is defined corresponding entries are generated in the crontab.

A separate calendar screen must be created for each command or script. Further conditions for starting or suppressing reactions must be implemented in the script. These include, for example, the inclusion of public holidays.

In this application the tasks are preferably executed on the SMC since the System Console Software (SCS) is only directly available there.

Example

Activating a partition every Monday at 8.00 a.m..

Figure 25: PRIMEPOWER ServerView- window: “Create task”

Switching a partition on

A partition is switched on with the following SCS command:

```
/opt/FJSVcsl/bin/node_control -up <machine_name> -pid=<partition ID>
```

Example

```
/opt/FJSVcsl/bin/node_control -up fernando0 -pid=1
```

After the power supply has been switched on the system unit is started up. After the POST (Power On Self Test) the Solaris operating system and, in the BS2000 partitions, the X2000 carrier system is started automatically if the mode selector in the SX server's control panel is set to LOCK (see figure "Control panel of an SX140 or SX150 server"). Furthermore, no time interval may be set via the Auto Power Control System (APCS) of SCS in which the system is to be deactivated. Settings in the APCS are made via *Machine Administration Menu* (*System-Specific Administration -> select machine_name -> APCS Administration*).

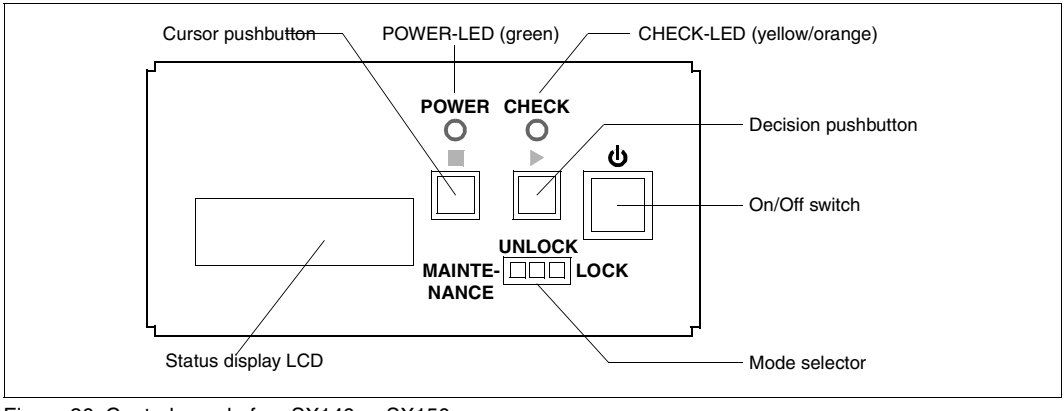


Figure 26: Control panel of an SX140 or SX150 server

When X2000 is started, BS2000/OSD is also started automatically if this was specified by setting the automatic IPL. This setting must be made in the *BS2-KVP* register of the *Bs2Devices* application of PRIMEPOWER ServerView:

1. Select the first entry with the KVP name *HV0* and click on it with the right mouse button.
2. Then set the function "*Configuration of automatic IPL*".

The *machine_name* and *partition ID* parameters needed for this command can be ascertained in the CDE interface on the SMC. After you have pulled down the icon *Configuration* on the System Console (SCS) the *machine_name* is displayed in the *Server* column and the *partition ID* in the *PID* column.

Example

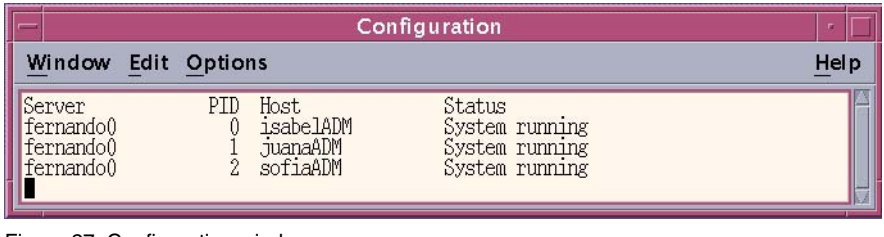

Configuration
Window Edit Options Help
Server PID Host Status
fernando0 0 isabelADM System running
fernando0 1 juanaADM System running
fernando0 2 sofiaADM System running

Figure 27: Configuration window

Switching a partition off

A partition is switched off using the following SCS command:

```
/opt/FJSVcsl/bin/node_control -down <machine_name> -pid=<partition ID>
```

Example

```
/opt/FJSVcsl/bin/node_control -down fernando0 -pid=1
```

In this case any Solaris system which is still running is closed down in an orderly manner and the power supply to this partition is interrupted. This procedure can take about 1 minute.

In BS2000 partitions any BS2000 system which is still running will be shut down and X2000 then closed down. A prerequisite here is that shutdown is really specified in the *BS2-KVP* register of the *Bs2Devices* application of PRIMEPOWER ServerView under “Definition of the BS2000 shutdown command”.

Comments

- The Auto Power Control System of SCS (APCS, see the section “Switching the server on/off on a scheduled basis” on page 66) can only be used to switch the entire server on/off on a time-driven basis .
- *Machine Administration Menu* (*System-Specific Administration -> select machine_name -> System/Partition Power Administration*) enables a partition to be switched on or off, but not on a time-driven basis.

Information functions

The power on/off status of one or more server partitions, together with system-board-specific information, can be ascertained using the following function:

```
/opt/FJSVcsl/bin/get_node_conf <machine_name> -s [-pid=<partition ID>]
```

Example

```
/opt/FJSVcsl/bin/get_node_conf fernando0 -s
```

```
root@fernandoADM # /opt/FJSVcsl/bin/get_node_conf fernando0 -s
SB#00-0:type=1,pid=00,serial=PB350A0403,status=ON
SB#00-1:type=1,pid=00,serial=PB350A0403,status=ON
SB#00-2:type=1,pid=01,serial=PB350A0403,status=OFF
SB#00-3:type=1,pid=01,serial=PB350A0403,status=OFF
SB#01-0:type=1,pid=02,serial=PB350A0603,status=ON
SB#01-1:type=1,pid=02,serial=PB350A0603,status=ON
SB#01-2:type=1,pid=00,serial=PB350A0603,status=ON
SB#01-3:type=1,pid=00,serial=PB350A0603,status=ON
root@fernandoADM #
```

4.3.1.4 Administering the system board's operating mode

In SX140 systems or higher it is possible to define, ascertain or modify the operating mode of any system board located in a cabinet slot. A system board can be operated in the following modes:

X for the extended system board (XSB) mode

P for the physical system board (PSB) mode

On SX130 systems there are only physical system boards.

- In the *Machine Administration Menu* (see figure 21 on page 58) select the menu item *System-Specific Administration*:

  ```
  1 <RETURN>
  ```

- Select the required server.

- In the *System-Specific Administration* menu (see figure 22 on page 60) select the menu item *SB Mode Administration*.

  ```
  13 <RETURN>
  ```

  Comment

  On SX140 systems you must select the menu item *System Board Maintenance Administration* and then *SB Mode Administration* in the *System-Specific Administration* menu.

The *SB Mode Administration* menu is opened:

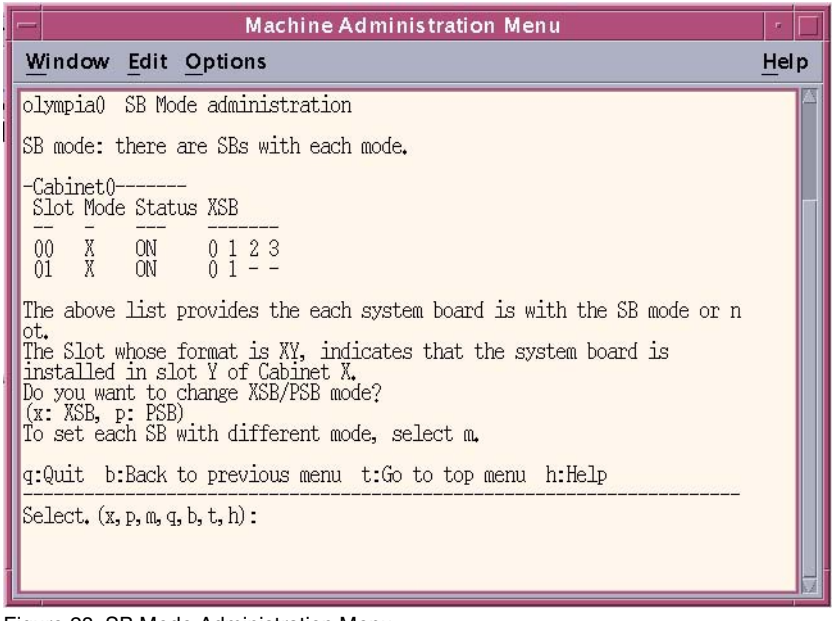

Machine Administration Menu
Window Edit Options Help
olympia0 SB Mode administration
SB mode: there are SBs with each mode.
-Cabinet0-------
Slot Mode Status XSB
-- - --- -------
00 X ON 0 1 2 3
01 X ON 0 1 - -
The above list provides the each system board is with the SB mode or n
ot.
The Slot whose format is XY, indicates that the system board is
installed in slot Y of Cabinet X.
Do you want to change XSB/PSB mode?
(x: XSB, p: PSB)
To set each SB with different mode, select m.
q:Quit b:Back to previous menu t:Go to top menu h:Help
Select. (x, p, m, q, b, t, h):

Figure 28: SB Mode Administration Menu

The current operating mode of each system board in a slot *s* in cabinet *c* (presented in the format *cs* in the *Slot* column, in other words, for example, *01* for slot *1* and cabinet *0*) is displayed in the *Mode* column of this menu:

X The system board is operated in XSB mode.

P The system board is operated in PSB mode.

The status id the system board is also displayed in the *Status* column. The following values are possible:

– – – The system board is not inserted in the slot.

ON The system board is turned on.

OFF The system board is not used or the power is off.

ALM The system board is inserted in the slot and is working, but not correctly.

ON* PCI/DISK BOX or memory are not installed or the installation cannot be recognized.

In XSB mode the numbers of the configured XSBs are displayed in the XSB column for each slot in each cabinet.

This menu also enables a system board to be configured or modified. To modify a board you must first select the function *m*. You can then use the function *x* in XSB mode and the function *p* in PSB mode to modify it (see also the *Select* line in figure 28 on page 76).

- After a modification you must restart SCS:

```
#/etc/init.d/FJSVscsl restart
```

4.3.1.5 Configuring and modifying partitions

Partitions can be configured for the operating systems and applications which run on them using the physical and/or (from SX140 systems on) the extended system board mode. In this case a partition can, however, only incorporate on type of system board mode.

- In the *Machine Administration Menu* (see figure 21 on page 58) select the menu item *System-Specific Administration*:

  ```
  1 <RETURN>
  ```

- Select the required server.
- In the *System-Specific Administration* menu (see figure 22 on page 60) select the menu item *Partition/System Board Administration*.

  ```
  6 <RETURN>
  ```

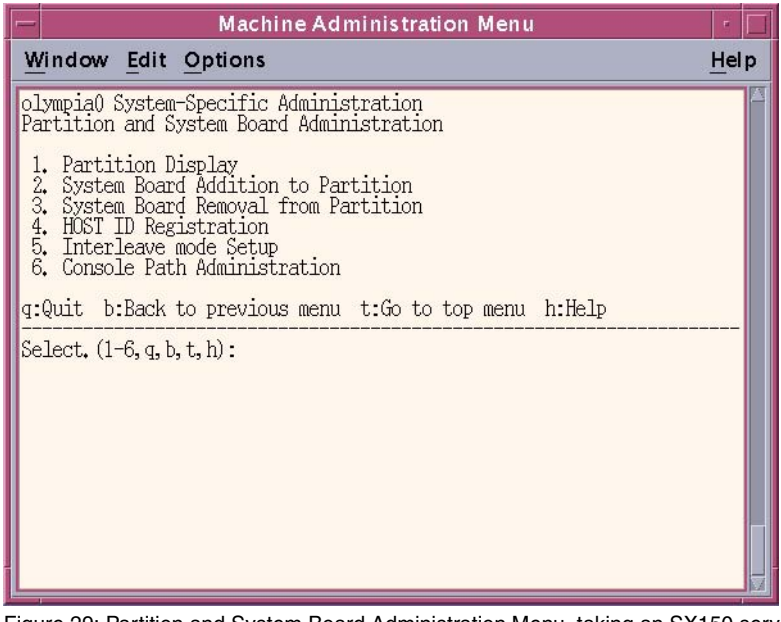

Machine Administration Menu
Window Edit Options Help
olympia0 System-Specific Administration
Partition and System Board Administration
1. Partition Display
2. System Board Addition to Partition
3. System Board Removal from Partition
4. HOST ID Registration
5. Interleave mode Setup
6. Console Path Administration
q:Quit b:Back to previous menu t:Go to top menu h:Help
Select.(1-6,q,b,t,h):

Figure 29: Partition and System Board Administration Menu, taking an SX150 server as an example

Adding a system board to a partition

► To add a system board to a partition select the menu item *System Board Addition to Partition* in the *Partition and System Board Administration* menu:

```
2 <RETURN>
```

The *System Board Addition to Partition* menu is opened. This provides information on the division of the system boards to the partitions and their status.

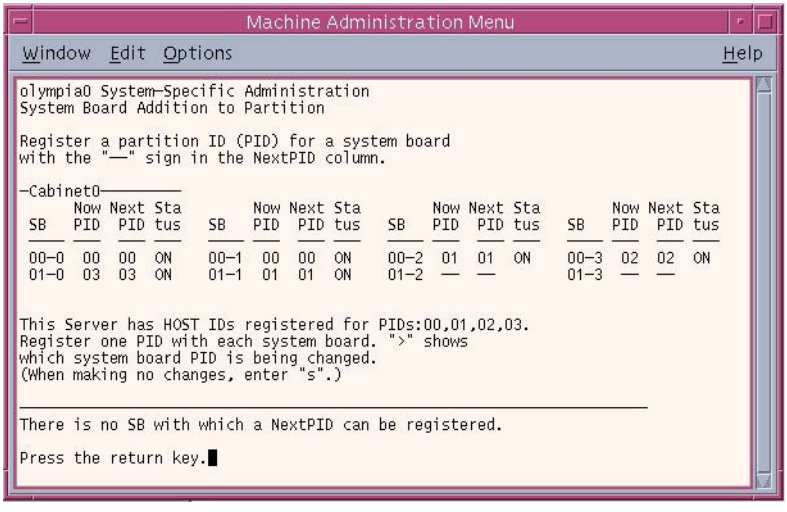

Machine Administration Menu
Window Edit Options Help
olympia0 System-Specific Administration
System Board Addition to Partition
Register a partition ID (PID) for a system board
with the "—" sign in the NextPID column.
-Cabinet0-
Now Next Sta Now Next Sta Now Next Sta Now Next Sta
SB PID PID tus SB PID PID tus SB PID PID tus SB PID PID tus
00-0 00 00 ON 00-1 00 00 ON 00-2 01 01 ON 00-3 02 02 ON
01-0 03 03 ON 01-1 01 01 ON 01-2 — — 01-3 — —
This Server has HOST IDs registered for PIDs:00,01,02,03.
Register one PID with each system board. ">" shows
which system board PID is being changed.
(When making no changes, enter "s".)
There is no SB with which a NextPID can be registered.
Press the return key.

Figure 30: System Board Addition to Partition Menu, taking an SX150 server as an example

The “SP” display in the Now *PID* column indicates that this system board is in the system board pool. The > sign in front of the SB column indicates which system board is being processed with this screen.

► You must then enter the number of the partition which you assign to this system board, or enter “s” if you do not wish to initiate an action.

The modifications only take effect after Solaris has been rebooted.

Removing a system board from a partition

► To remove a system board from a partition select the menu item *System Board Removal from Partition* in the menu *Partition and System Board Administration*:

```
3 <RETURN>
```

The *System Board Removal from Partition* menu is opened. This provides information on the division of the system boards to the partitions and their status.

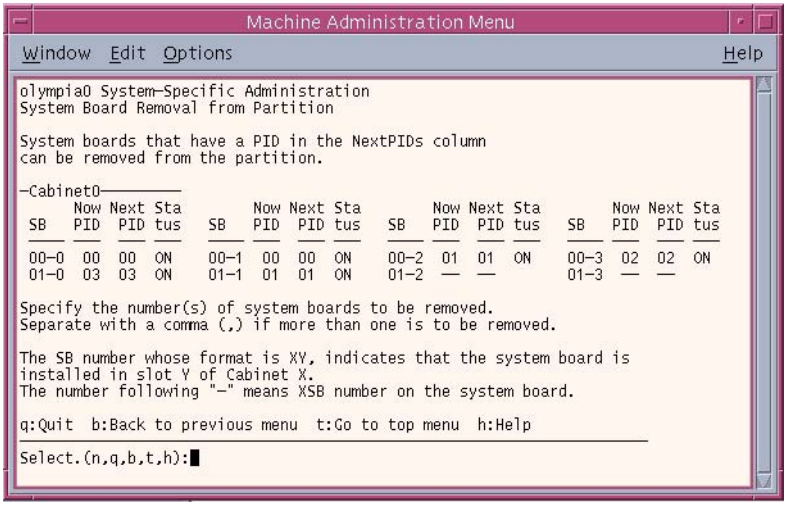

Machine Administration Menu
Window Edit Options Help
olympia0 System-Specific Administration
System Board Removal from Partition
System boards that have a PID in the NextPIDs column
can be removed from the partition.
-Cabinet0
SB Now PID Next PID Sta tus
00-0 00 00 ON
01-0 03 03 ON
00-1 00 00 ON
01-1 01 01 ON
00-2 01 01 ON
01-2 — —
00-3 02 02 ON
01-3 — —
Specify the number(s) of system boards to be removed.
Separate with a comma (,) if more than one is to be removed.
The SB number whose format is XY, indicates that the system board is
installed in slot Y of Cabinet X.
The number following "-" means XSB number on the system board.
q:Quit b:Back to previous menu t:Go to top menu h:Help
Select.(n,q,b,t,h):

Figure 31: System Board Removal from Partition Menu, taking an SX150 server as an example

The “SP” display in the Now *PID* column indicates that this system board is in the system board pool.

► Enter the number(s) of the system board(s) (separated by a comma) which you want to remove from a partition.

The modifications only take effect after Solaris has been rebooted.

4.3.1.6 Configuring/changing the partitioning

At least one partition of the SX server is reserved for running BS2000/OSD. These partitions are designated below as BS2000/OSD partitions.

In addition to the BS2000/OSD partitions, an SX server can include Solaris partitions. Configuring a Solaris partition and adding or removing system boards of a partition is carried out in the same way as for the PRIMEPOWER servers.

The necessary actions for Solaris partitions are described in the manuals “System Console Software User’s Guide (SCS)” [7], “Partition Operation Guide” [27] and “Dynamic Reconfiguration – Introduction to the Procedure” [25].

4.3.1.7 Displaying the configuration

You can display the hardware configuration and the operating status of the server using the *Machine Administration Menu*. This is particularly important for the Solaris part of the server. In addition, PRIMEPOWER ServerView offers options for displaying the operating status of the individual partitions under DomainAdmin. For further information, see the manual “PRIMEPOWER ServerView Suite V2.2 – System Administration within a Domain” [5].

Select *System Specific Administration* (see figure 22 on page 60) from the menu *Machine Administration Menu* (see figure 21 on page 58), to list the servers managed by the SMC. Then select the relevant server.

Now you can call up information on the hardware and partition configuration:

- Server hardware configuration

  After selecting *Hardware Configuration Displays*, the following menu is opened. This example is for an SX130 server:

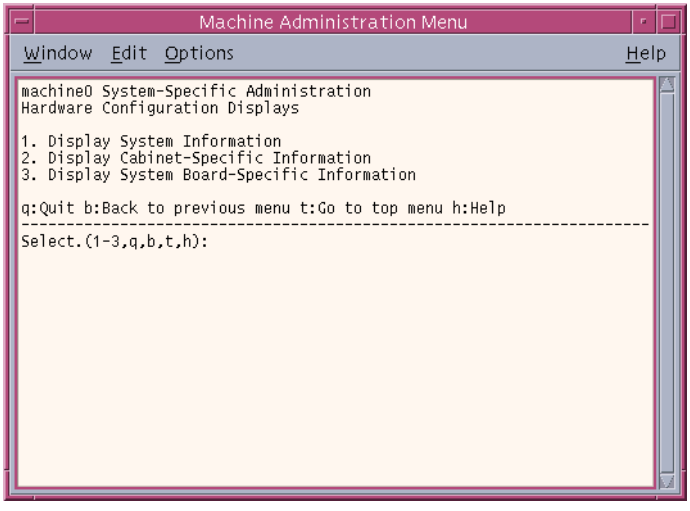

Machine Administration Menu
Window Edit Options Help
machine0 System-Specific Administration
Hardware Configuration Displays
1. Display System Information
2. Display Cabinet-Specific Information
3. Display System Board-Specific Information
q:Quit b:Back to previous menu t:Go to top menu h:Help
Select.(1-3,q,b,t,h):

Figure 32: Machine Administration Menu: “Hardware Configuration Displays”

  The following options are available:

  – Display of server-specific information (*Display System Information*)
  – Display of system-cabinet-specific information (*Display Cabinet Specific Information*; valid for SX130 servers only)
  – Display of system-board-specific information (*Display System Board Specific Information*; valid for SX130 servers only)

For the SX servers as of the SX140 model series both system-cabinet-specific and system-board-specific information is included in the server-specific information.

> **i** In this example for the SX130, the server-specific information should be displayed.

- Partition configuration

  The assignment of system boards to partition numbers can be viewed with *Partition Display* or *System Board Status Display* under *Partition/System Board Administration*. The key information which is displayed is the number of the system board, the current partition ID and the partition ID on the next system start.

Example for SX130: displaying system information (*Display System Information*)

Enter “1”; the server-specific information will be displayed:

```
PRIMEPOWER800 Serial No:23092; System Clock:225 MHz;
    Operation Panel Switch:Lock; Altitude:0 m;
    Partition#00  1 System Board;
        Hostname:bari1; Host ID:80f30766;
        Partition MAC:00.00.0e.25.07.66;
        Partition Node address:10100;
        CPU Clock:675 MHz; Enable Clock:675 MHz;
    Partition#01  1 System Board;
        Hostname:bari2; Host ID:80f3071d;
        Partition MAC:00.00.0e.25.07.1d;
        Partition Node address:10101;
        CPU Clock:675 MHz; Enable Clock:675 MHz;
    Partition#02  1 System Board;
        Hostname:bari3; Host ID:80f309a4;
        Partition MAC:00.00.0e.25.09.a4;
        Partition Node address:10102;
        CPU Clock:675 MHz; Enable Clock:675 MHz;
    Partition#03  1 System Board;
        Hostname:bari4; Host ID:80f309a5;
        Partition MAC:00.00.0e.25.09.a5;
        Partition Node address:10103;
        CPU Clock:675 MHz; Enable Clock:675 MHz;
    Cabinet#0 Serial No:23092; RCI(000101ff);
        Partition[ 00 01 02 03 ] Master Clock;
```

This menu item displays the following information about the server:

Model
: Specifies the model name, serial number and clock frequency of the server.

Operation panel
: Specifies the position of the mode selector and the height above sea-level at which the server is installed.

Partition
: Displays information on previously defined partitions. This includes partition IDs of the relevant partitions, the number of system boards, server IDs, MAC addresses, node addresses and CPU clock frequency.

Cabinet
: Shows information about the system cabinet. This includes the cabinet ID, cabinet serial number, RCI addresses and the ID numbers of the partitions.

4.3.1.8 Error notifications

The system console SMC detects hardware errors on the server and generates messages when an error occurs. This involves the following functions:

– Displaying detected errors in the message window of the console (monitoring messages)
– Notifying the administrator or service engineer by e-mail
– Notifying the service provider via Teleservice

The settings for outputting error notifications via message windows or e-mail are defined in the *System-Specific Administration* menu (see figure 22 on page 60) under *System Notification Administration*:

1. Select *System-Specific Administration* from the *Machine Administration Menu* (see figure 21 on page 58).
2. Select the server whose data you wish to view (see figure 21 on page 58).
3. Select *System Notification Administration*:

   This outputs the following screen:

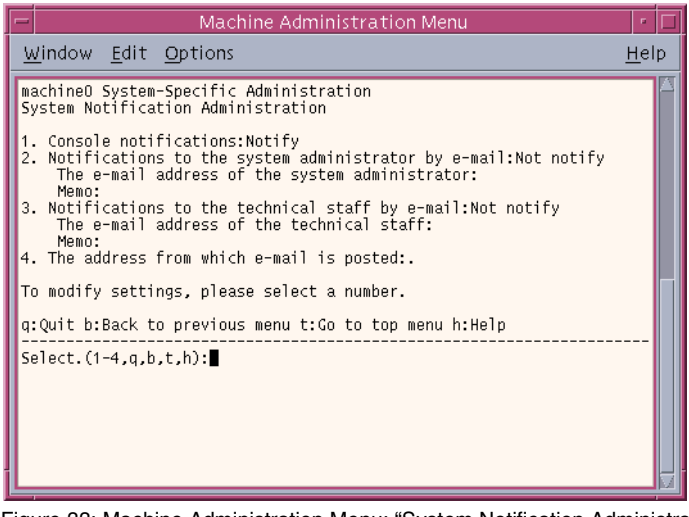

Machine Administration Menu
Window Edit Options Help
machine0 System-Specific Administration
System Notification Administration
1. Console notifications:Notify
2. Notifications to the system administrator by e-mail:Not notify
The e-mail address of the system administrator:
Memo:
3. Notifications to the technical staff by e-mail:Not notify
The e-mail address of the technical staff:
Memo:
4. The address from which e-mail is posted:.
To modify settings, please select a number.
q:Quit b:Back to previous menu t:Go to top menu h:Help
Select.(1-4,q,b,t,h):

Figure 33: Machine Administration Menu: “System Notification Administration”

You can make the following settings under *System Notification Administration*:

- Output error messages in a message window on the system console
- Notify the system administrator by e-mail

  Determine whether the system administrator is to be informed by e-mail about errors which occur.

  If a notification is to be made, specify further information about the system administrator, e.g. his/her name and e-mail address.
- Notify the relevant service engineer by e-mail

  If a notification is to be made, specify further information about the service engineer, e.g.his/her name and e-mail address.
- Sender of the e-mail

  Specify the e-mail address of the sender.

When notifying by e-mail, it is necessary to enter an SMTP server to which the mails can be sent; enter this in the file `/etc/hosts`.

This entry must be created in the following format:

```
<IP address> <server name> mailhost
```

The name `mailhost` is predefined. It instructs Solaris to send mails to this address.

4.3.2 Consoles of the partitions with RC2000

This section describes how the RC2000 system (RC = Remote Console) is handled.

Activating RC2000

This function is called up by selecting *RC2000* from the system console menu (see figure 20 on page 56) or by double-clicking the *RC2000* icon in the Application Manager (see figure 11 on page 30):

When RC2000 has been activated, a host browser is displayed.

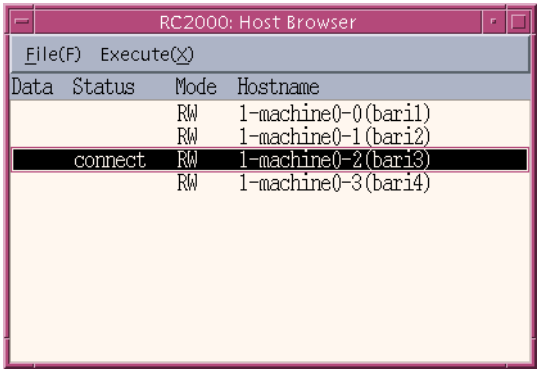


Figure 34: RC2000 main window

Automatic activation with login

When you log in at the system console for the first time, RC2000 is activated with the default window size and positioning. When you log in on subsequent occasions, RC2000 will be displayed as it was stored at the last log off.

The RC2000 window will not be automatically displayed if it was not opened when the system was last closed. Log on for the SCS main window and then activate RC2000 via the SCS button.

Activating from the Application Manager window

- Double-click the RC2000 icon in the Application Manager window.

Activating the console window of partitions

Proceed as follows to open the console window:

Activating from the menu

1. Select a partition from the host browser (RC2000).
2. Select [Connect] from the Execute menu.

The console window of the partition selected in the host browser is then displayed.

Activating with a double-click

► Double-click the partition in the host browser.

The console window of the partition selected in the host browser is then displayed.

Only one console window can be opened for each partition, in which read/write operations can be carried out. A maximum of 14 console windows can be opened, however, which only have read permission.

Under the menu item Execute you can edit the access rights for the console window.

Closing the console window

Proceed as follows to close the console window again:

Closing via the menu of the host browser

1. Select a partition from the host browser.
2. Select [Disconnect] in the Execute menu.

The console window of the partition selected in the host browser is then closed.

Closing via the menu of the console window

1. Open the application menu in the top left corner of the console window to be closed.
2. Select *Exit*.

The relevant console window is then closed.

4.3.2.1 OBP

OBP mode only applies to one partition. It is used, for instance, to perform an offline backup.

After a partition is switched on or reset, a POST sequence (POST = Power On Self Test) is started. This tests the hardware and checks the hardware configuration. The OBP (OBP = OpenBoot™ PROM) is then called up. This checks the PCI devices.

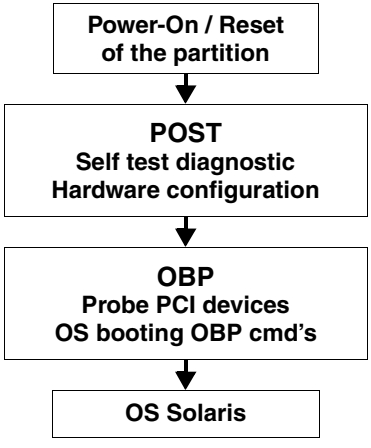


Figure 35: Sequence of POST, OBP and Solaris startup after switching on or a reset

If the mode selector is set to *Unlock* or *Maintenance*, the following OBP prompt appears:

```
{0} ok
```

If the mode selector is set to “Lock”, the partition must be terminated with `init 0`. This automatically takes you into the OBP mode.

From this mode, Solaris can be started with the relevant command. Specific OBP commands can also be entered here.

Example of screen outputs until the OBP prompt appears

```
POST Sequence 03
...
POST Sequence 1a
POST Sequence Complete
Fujitsu Siemens PRIMEPOWER800 2-slot 4x SPARC64 IV 675MHz
OpenBoot 3.14.7-1, 4096 MB memory installed
Ethernet address 0:0:e:25:5:22, Host ID: 80f30522.
{0} ok
```

OBP commands

OBP help function

```
{0} ok help
```

A help text on the individual commands is output:

```
{0} ok help
go
boot
boot <device-name>
printenv
setenv <name> <value>
devalias
devalias <name> <value>
show-devs

Many Other commands are available.
{0} ok
```

System and boot configuration parameters

`printenv`	Shows the possible variable values which can be set in OBP
`setenv [var] [value]`	Sets the variable values
`set-defaults`	Resets the variables to the default values
`set-default boot-device`	Resets the variable for the boot disk to the default value

File download and boot

`boot [dev] [kernel] [opts]`	Boots in multiuser mode
`boot -s`	Boots in single user mode
`boot -a`	Boots interactively
`boot -r`	Boots after changing the hardware configuration
`boot -b`	Boots for diagnostics purposes Loads a mini kernel. Only available to `/root`.
`boot -v`	Boots with additional information (verbose mode)
`boot net0`	Boots from the network

Power off and reset

`reset-all`	Hardware reset
`power-off`	Powers the system off

Diagnostics routines

`probe-scsi`	Probes SCSI devices on the first SCSI controller
`probe-scsi-all`	Probes SCSI devices on all SCSI controllers

Show commands

`show-post-results`	Show POST result
`show-devs`	Show all installed devices (including hardware path)
`show-disks`	Show path of disks
`show-tapes`	Show path of tape devices
`show-nets`	Show path of networks

Showing/setting aliases

`devalias`	Shows aliases
`devalias <name> <path>`	Sets aliases (volatile)
`nvalias <name> <path>`	Sets aliases (permanent)
`nvunalias <name>`	Deletes an alias

Troubleshooting for RED State Exception

```
.registers
.locals
ctrace
```

Troubleshooting after the system has hung

```
sync
```

Miscellaneous

`.version`	Version of OBP, POST, SCF & RCI
`.speed`	Clock frequency of CPU, UPA and PCI
`.enet-addr`	MAC address on basis of Ethernet adapter
`banner`	Shows boot system information
`setenv diag-level <value>`	Sets diagnostics level (values: off, min, max)
`setenv diag-switch? <value>`	Outputs POST information at the console (values: true, false; default: false)

4.3.2.2 Starting Solaris

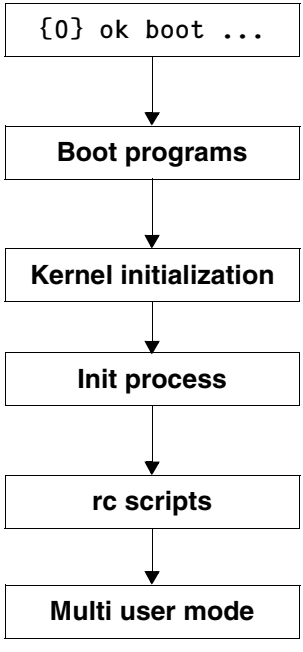
Enter the following command in OBP mode:

```
{0} ok boot disk
```

`disk` here is the alias of the boot disk. The full command with the physical device name of the boot disk would be, for instance:

```
{0} ok boot /pci@8c,2000/scsi@1/disk@1,0:a
```

Sequence of the boot operation:



OBP reads the first 16 blocks from the root disk to load the `bootblk` program. This can access the directory `/root` (ufs).

The program `bootblk` runs the second boot program `/platform/FJSV,GPUSK/ufsboot` and loads it into the memory. The kernel is then loaded.

The hardware-dependent part of `ufsboot` is loaded first: `/platform/FJSV,GPUSK/kernel/sparcv9/unix`. Then the hardware-independent part is loaded: `/platform/FJSV,GPUSK/kernel/sparcv9/genunix`.

The kernel generates a user process and starts the process `/sbin/init`, which in turn starts other processes when the file `/etc/inittab` has been read.

The process `/sbin/init` starts rc scripts (rc = run control) which execute a series of other scripts. These scripts check and mount file systems, start various processes and execute system tasks.

Figure 36: Boot process sequence

4.3.3 Monitoring messages

If the system console detects a server error, an error message is displayed in the window *Monitoring Messages*.

Double-click the icon in the Application Manager to call up the window *Monitoring Messages* (see figure 11 on page 30) or select it from the system console menu (see figure 20 on page 56):

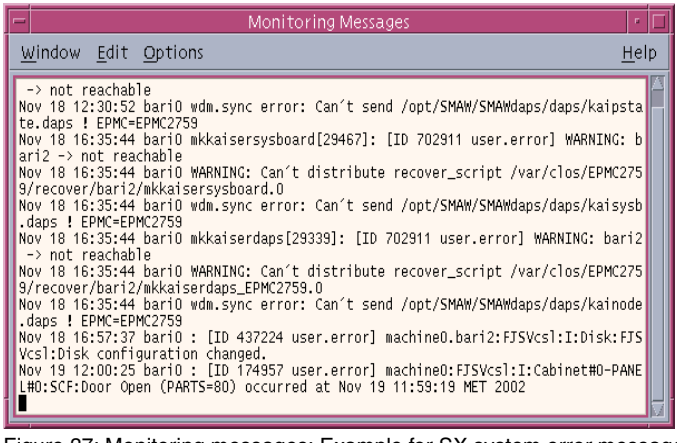

Monitoring Messages
Window Edit Options Help
-> not reachable
Nov 18 12:30:52 bari0 wdm.sync error: Can´t send /opt/SMAW/SMAWdaps/daps/kaipsta
te.daps ! EPMC=EPMC2759
Nov 18 16:35:44 bari0 mkkaisersysboard[29467]: [ID 702911 user.error] WARNING: b
ari2 -> not reachable
Nov 18 16:35:44 bari0 WARNING: Can´t distribute recover_script /var/clos/EPMC275
9/recover/bari2/mkkaisersysboard.0
Nov 18 16:35:44 bari0 wdm.sync error: Can´t send /opt/SMAW/SMAWdaps/daps/kaisysb
.daps ! EPMC=EPMC2759
Nov 18 16:35:44 bari0 mkkaiserdaps[29339]: [ID 702911 user.error] WARNING: bari2
-> not reachable
Nov 18 16:35:44 bari0 WARNING: Can´t distribute recover_script /var/clos/EPMC275
9/recover/bari2/mkkaiserdaps_EPMC2759.0
Nov 18 16:35:44 bari0 wdm.sync error: Can´t send /opt/SMAW/SMAWdaps/daps/kainode
.daps ! EPMC=EPMC2759
Nov 18 16:57:37 bari0 : [ID 437224 user.error] machine0.bari2:FJSVcsl:I:Disk:FJS
Vcsl:Disk configuration changed.
Nov 19 12:00:25 bari0 : [ID 174957 user.error] machine0:FJSVcsl:I:Cabinet#0-PANE
L#0:SCF:Door Open (PARTS=80) occurred at Nov 19 11:59:19 MET 2002

Figure 37: Monitoring messages: Example for SX system error messages

The error messages are not necessarily displayed in the monitoring window in the order in which they occurred.

4.4 Time synchronization between SMC and the partitions

All instances running on an SX server have their own separate time management system, but all use the same time. This affects:

- The System Management Console
- All partitions (BS2000 and, optionally, Solaris)
- The optional SKP-SR

This also applies to the SX series entry-level models (see section “Time cluster with external time servers” on page 131).

By default, an NTP cluster is configured under these instances via the administration LAN of the server. Generally, the SMC is the main NTP server. The quality of this NTP server (stratum) also determines the quality of the BS2000 time emulated by X2000. Without additional external timers, the SMC is configured as an NTP server with stratum 5 and the partitions are configured as NTP clients.

The scale for the quality of the NTP server (stratum) ranges from 0 to 15. The best NTP server quality (level 1) is found on a server with an official time reference, i.e. with a connected radio clock which receives an official time signal, or a GPS receiver connected to receive time. For each server which acts, on the one hand, as an NTP client of a better server and, on the other hand, as a server for additional clients, the stratum value is raised (therefore devalued) by 1.

The use of an external timer for BS2000 is basically not required as BS2000 automatically synchronizes with the Solaris time of the X2000 carrier system. When demands on the precision of the time reference are more stringent, however, the use of an external timer is recommended for the SMC. When using VM2000, the exact time is implicitly made available to all VMs.

For external timers the following options come into question:

- An NTP time server with the quality of an external timer
- A 3920 time server which is connected to the admin LAN
- An SKP-SR with a serially-connected radio clock or a 3920 time server

In addition, BS2000 partitions can be integrated into a computer network where the time of the members is synchronized (DCE cluster or XCS cluster). If S-servers are also available in this cluster, the SKP-X of these systems should participate in the NTP cluster of the SX server. If the cluster comprises several SX servers, they should all participate in the same NTP cluster.

The configuration of the SMC as an NTP server and of the partitions as NTP clients as supplied is described below. If an external timer (with an official time reference, i.e. stratum 1) is used, the configuration of the SMC must be changed, so that it operates in addition to its task as an NTP server for the partitions as an NTP client of this external timer.

In this case, the stratum value of the SMC as a server for the partitions is improved to value 2. In the BS2000 system of a partition, the system time is displayed as synchronized with an external reference when the stratum value in Solaris/X2000 is better than 5 (the default of the SMC). Accordingly, the `/SHOW-SYSTEM-INFORMATION` command in BS2000 outputs the value `SERVER-CONN-EXT-REF` in the `SYNCHRONISATION` field of the `SYSTEM-TIME-PARAMETERS` section.

NTP server configuration (System Management Console)

During the installation of the System Management Console, the NTP configuration file was created for the console with the command `partition_setup` and the option `-n`.

The command generates the following contents of the file `/opt/FJSVscsl/etc/ntp.conf`:

```
server 127.127.1.0 prefer
fudge 127.127.1.0 stratum 5
enable auth monitor
driftfile /var/ntp/ntp.drift
statsdir /var/ntp/ntpstats/
filegen peerstats file peerstats type day enable
filegen loopstats file loopstats type day enable
filegen clockstats file clockstats type day enable
```

When using an external time server, the IP address of this server must be made known to the SMC. The following entry is added to the start of the file:

```
server xxx.xxx.xxx.xxx prefer # IP-Adresse des NTP-Servers
```

The first line of the file must also be modified as follows:

```
server 127.127.1.0
```

Modifications should be entered only in the NTP configuration file on the SMC. No changes should be made in the NTP configuration files on the partitions.

To activate modification in the NTP configuration file on the SMC the administrator (with root authorization) SCS must be restarted (here the NTP daemons in the partitions must not be restarted):

```
#/etc/init.d/FJSVscsl restart
```

If the time of the System Management Console is more than 1000 seonds ahead of or behind the time of a partition the time cannot be automatically synchronized via NTP (start of the NTP daemon of the partitions or of the NTP client is suppressed). In this case the times must be synchronized manually.

Information on manual time synchronization is provided in the manual “System Console Software User’s Guide (SCS)” [7].

NTP client (partitions)

The partitions operate as NTP clients. When installing Solaris using the `partition_setup` command (parameter `-n`), the file `/etc/inet/ntp.conf` was generated with the following contents:

```
server XXX.XXX.XXX.XXX # IP address of the system management console
server 127.127.1.0
fudge 127.127.1.0 stratum 9
enable auth monitor
driftfile /var/ntp/ntp.drift
statsdir /var/ntp/ntpstats/
filegen peerstats file peerstats type day enable
filegen loopstats file loopstats type day enable
filegen clockstats file clockstats type day enable
```

NTP diagnostic commands (for the SMC and the partitions)

ntpq and xntpdc

The ntpq and xntpdc commands supply information on the current status of the NTP daemon on the home server or on another server in the network. Multiple status changes and commands can also be triggered.

Sample call

```
ntpq -p [NTP-server]
```

Here `NTP-server` designates the server for which the information is to be output. A list of the reference sources (peers) used by the specified server is output in tabular form together with the status information for the individual peers in tabular form (see the following example):

```
root@fernandoADM # ntpq -p
     remote           refid      st t when poll reach   delay   offset    disp
==============================================================================
 LOCAL(0)        LOCAL(0)         5 l    2   64  377     0.00    0.000   10.03
*sunrise         bali.mch.fsc.ne  3 u   33   64  377     0.53    0.594    0.23
root@fernandoADM #
```

Figure 38: NTP diagnostic command ntpq (example)

Meaning of the values in the entry:

– Name or address of the peer
– Reference ID (0.0.0.0 if the reference ID is unknown)
– Stratum value of the peer
– Type of peer (local, unicast, multicast or broadcast)
– Number of seconds which have passed since the last polling cycle
– Polling interval in seconds
– Reachability Register (octal)
– Currently ascertained delay (runtime of the query), offset (time difference between the reference time and the home system time) and the dispersion (order of magnitude of the fluctuations) of the peer in milliseconds

The sign in the first column of an entry shows the status of this peer in the time selection procedure:

*	Peer is selected for synchronzation
+	Peer is in the candidate list
Blank	Peer was rejected as time source

ntptrace

The ntptrace command provides information on where an NTP server gets its time and traces the entire chain of NTP servers back to its origin

Sample call

```
ntptrace [NTP-server]
```

Here `NTP-server` designates the server from which the chain is to be traced. If no server name is specified the chain starts with the local NTP server. Per element of the chain the information output contains a line with the following entries (see also the example below):

– Name of the NTP server
– Stratum value of the NTP server
– Time offset (in seconds) between the NTP server and the local host
– Synchronization difference (in seconds) of the NTP server
– Reference clock ID (only for servers with stratum value 1)

```
root@fernandoADM # ntptrace
localhost: stratum 4, offset 0.000034, synch distance 0.03627
sunrise: stratum 3, offset 0.000599, synch distance 0.01469
bali.mch.fsc.net: stratum 2, offset 0.000601, synch distance 0.01335
139.23.202.31: stratum 1, offset 0.000957, synch distance 0.00143, refid 'PPS'
root@fernandoADM #
```

Figure 39: NTP diagnostic command ntptrace (example)

Further information is provided in the Solaris man pages on these commands.

4.5 Backing up/restoring the SMC

If you create data backups at regular intervals, you can restore your data easily in the event of a system crash. The following sections describe the procedures for creating backups and explain which data types must be backed up. A DAT drive is available to the SMC for storing the backed up data.

SMC data (SCS software, SMC disk, Teleservice data) is saved when the system is commissioned or after changes have been made by service staff.

The SMC supports two backup procedures. The backup cycle depends on the selected procedure:

- Backing up the system drive after regular maintenance work or after the location of the SMC has been changed
- Backing up the configuration data of the System Console Software (SCS) after the user has been registered and/or the configuration data has been changed

WARNING!
Recovery measures after drive failures or similar events which require the system to be recovered should only be carried out by a qualified service engineer.

4.5.1 SCS configuration data

This section describes how to back up and restore the SCS configuration data.

4.5.1.1 Backing up the configuration data of the System Console Software (SCS)

A backup of the configuration data of the System Console Software is of benefit if you wish to replace an incorrect configuration setting with the old configuration. The System Console Software includes the commands needed to create the backup. Backing up the configuration data is particularly recommended when the configuration of the System Console Software is to be changed. Approximately 1 to 2 MB of data are backed up during a backup of this type.

In order to back up the configuration data of the System Console Software, you need a DAT data cartridge.

Proceed as follows to back up the configuration data of the System Console Software:

1. Log on at the SMC as `root`.
2. Insert a data cartridge in the DAT drive. Check beforehand that the cartridge is not write-protected, i.e. that the write-protect tab is set at “writeable”.
3. Enter the following command to start the backup process:

   ```
   SMC# /opt/FJSVscsl/bin/scslbackup -t /dev/rmt/0
   ```

   A prompt appears when backup is complete.
4. Press the eject button of the DAT tape drive to remove the data cartridge from the drive. Then activate write protection by putting the write protection tab of the data cartridge into the “write-protected” position.

4.5.1.2 Restoring configuration data of the System Console Software

To restore SCS configuration data which has been backed up (see previous section) you will need the DAT data cartridge on which the data has been backed up.

Proceed as follows to restore the backed up configuration data:

1. Log on at the SMC as `root`.
2. Switch to the ok prompt by entering the following command.

   ```
   SMC# /usr/sbin/shutdown -g0 -y -i0
   ```
3. Enter the following command to start the system in single-user mode.

   ```
   ok boot -s
   ```
4. Enter the root password to switch to single-user mode.

5. Insert the data cartridge containing the backed up configuration data in the DAT drive. Check beforehand that the data cartridge is write-protected, i.e. that the write protection tab is set at “writeable”.
6. Enter the following command to start restoring the configuration data:

   ```
   SMC# /opt/FJSVscsl/bin/scslrestore -t /dev/rmt/0
   ```

7. Initiate a reconfiguration of the system components and then restart the system:

   ```
   SMC# touch /reconfigure
   SMC# /usr/sbin/shutdown -g0 -y -i6
   ```

   The control panel LAN must be deactivated and then reactivated. To do this, use the *Machine Administration Menu* (see figure 21 on page 58):
   System Network Administration -> *System Network Administration Configuration Tools* -> *System Network Activation/Inactivation*.
8. Use the device management menu of the System Console Software to restore the monitoring log created by the device management program (this log involves data which is automatically saved in the partition at regular intervals).
9. If necessary, check and activate the APC system (see section “Switching the server on/off on a scheduled basis” on page 66).
10. Press the eject button of the DAT tape drive to remove the data cartridge from the drive.

4.5.2 System drive

4.5.2.1 Backing up the system drive of the SMC

This section describes how to back up offline.

When the system drive is backed up, all data saved on the hard disks which are installed in the SMC is transferred onto DAT data cartridges.

With this procedure, you can back up the data stored on all hard disks. This procedure is particularly useful for exchanging a faulty hard disk, since you can transfer all data backed up on the data cartridges onto the new hard disk. The system then regains the configuration which was valid at the time the backup was created.

This process, during which the data on all hard disks is written onto data cartridges, takes approximately one hour. All console functions are deactivated whilst the data is being saved.

The volume of data to be saved is so large that only DDS4 data cartridges (150 m) should be used.

Before you start the backup, check the amount of data stored on the hard disk.

To back up the data on the system drive, you will need:

– One DAT data cartridge, DDS4, 150 m

– The CD-ROM (1 of 2) with the Solaris software for the SMC

Proceed as follows to create a backup of the system drive:

1. Log on at the SMC as `root`.
2. Switch to OBP mode by entering the following command:

   ```
   SMC# /usr/sbin/shutdown -g0 -y -i0
   ```

3. Insert the Solaris CD-ROM in the CD-ROM drive.
4. Insert a data cartridge in the DAT drive. Check beforehand that the cartridge is not write-protected, i.e. that the write protection slider is set at “writeable”.
5. Start Solaris in single-user mode from the CD-ROM:

   ```
   ok boot cdrom -s
   ```

6. When a prompt appears, enter the command `format`. The system disks available for selection are offered.

   Example

   ```
   #format
   Searching for disks...done

   AVAILABLE DISK SELECTIONS:
   0. c0t0d0 <sfdsk type1.0; ST320420A cyl 39533 alt 2 hd
   16 sec 63>
   /pci@1f,0/pci@1,1/ide@3/dad@0,0
   Specify disk (enter its number):
   ```

   Enter the number of the required system disk (in the example `0` for `c0t0d0`).

   Close the menu with `q` (quit).

7. When a prompt appears, start the backup by entering the following command (use the controller number which you have confirmed in Step 6):

   ```
   SMC# dd if=/dev/rdsk/c0t0d0s2 of=/dev/rmt/0 bs=1024k
   ```

   The backup of the 8 GB hard disk drive takes approximately one hour. The larger the hard disk capacity, the longer the backup will take.

   A prompt appears again when the backup is complete.

8. Press the eject button of the DAT tape drive to remove the data cartridge from the drive. Then activate write protection by putting the write protection slider of the data cartridge into the “write-protected” position.

9. Switch to OBP mode by entering the following command:

   ```
   SMC# /usr/sbin/shutdown -g0 -y -i0
   ```

10. Enter the following command to restart the System Console Software:

    ```
    ok boot
    ```

    When the login window of the System Console Software appears, you can start normal system operation. Remove the Solaris CD-ROM from the CD-ROM drive.

4.5.2.2 Restoring the system drive of the SMC

To restore the system drive, you will need:

– The DDS4 data cartridges (150 m) with the backed up data of the system drive

– The CD-ROM (1 of 2) with the Solaris software for the SMC

WARNING!
The restore procedure explained below should only be carried out by a qualified service engineer.

Proceed as follows to restore the system drive:

1. Log on at the SMC as `root`.
2. Switch to OBP mode by entering the following command:

   ```
   SMC# /usr/sbin/shutdown -g0 -y -i0
   ```

3. Insert the Solaris CD-ROM in the CD-ROM drive.
4. Insert the data cartridge containing the backed up system drive in the DAT drive. Check beforehand that the data cartridge is write-protected, i.e. that the write protection slider is set at “writeable”.
5. Start Solaris 8 in single user mode from the CD-ROM:

   ```
   ok boot cdrom -s
   ```

6. When a prompt appears, enter the command `format`. The system disks available for selection are offered.

   Example

   ```
   #format
   Searching for disks...done

   AVAILABLE DISK SELECTIONS:
   0. c0t0d0 <sfdsk type1.0; ST320420A cyl 39533 alt 2 hd
   16 sec 63>
   /pci@1f,0/pci@1,1/ide@3/dad@0,0
   Specify disk (enter its number):
   ```

   Enter the number of the required system disk (in the example `0` for `c0t0d0`).

   Close the menu with `q` (quit).

7. When a prompt appears, start the restore process by entering the following command:

   ```
   SMC# dd if=/dev/rmt/0 of=/dev/rdsk/c0t0d0s2 bs=1024k
   ```

   When you enter this command, ensure that the value of the `bs` option (buffer size) is identical to the value used when the backup was created.

   The restore process for the 8 GB hard disk drive takes approximately one hour. The larger the hard disk capacity, the longer the restore process will take.

8. Press the eject button of the DAT tape drive to remove the data cartridge from the drive.

9. Switch to OBP mode by entering the following command:

   ```
   SMC# /usr/sbin/shutdown -g0 -y -i0
   ```

10. Enter the following command to restart:

    ```
    ok boot
    ```

    When the login window of the System Console Software appears, you can start normal system operation. Remove the Solaris CD-ROM from the CD-ROM drive.

11. Where necessary, you must restore the configuration data of the System Console Software. For more detailed explanations, see section “Restoring configuration data of the System Console Software” on page 98.

4.5.3 Configuration data of the CDE interface

All settings of the CDE interface for a login are located in the home directory of the user in the subdirectory `.dt`. This also includes the preconfigured terminals described in the section “Preconfiguring terminals” on page 32, if they have been incorporated into a subdirectory of the SCS folder; if this is not the case, the relevant files can be found directly in the home directory of the user.

To save these settings, it is advisable to include them in the backup of the configuration data of the System Console Software (see section “SCS configuration data” on page 98).

Alternatively, data can also be written separately onto a DAT cartridge with the command `tar`.

Backing up and restoring with scslbackup/scslrestore

For backups in the context of System Console Software, the administrator of the System Management Console must ensure that this data is included with the command `scslbackup`. The underlying procedure for backing up data with `scslbackup` is as follows:

1. The command searches all available directories under `/etc/opt/FJSVscsl/backup`
2. In these directories, scripts with the name `prebackup` (before the backup) and `postbackup` (after the backup) are executed, if they are available, in the context of the backup run.
3. For the actual data backup, a search is made in these directories for a file with the name `printlist`. These files contain the names of the files which are to be backed up on tape.
4. All files which are listed in the `printlist` files are backed up on tape.
5. When restoring data, the scripts `prerestore` (before the restore process) and `postrestore` (after the restore process) in the directories under `/etc/opt/FJSVscsl/backup` are executed.

To include further configuration data with the command `scslbackup`, proceed as follows:

– A new directory must be created in the directory `/etc/opt/FJSVscsl/backup` (any name, e.g. `CDEbackup`).

– A file with the name `printlist` must be created in this directory, containing all file names to be saved. As it is too time-consuming to create this manually, the file is created via the script `prebackup`. This may look like this:

```
#!/bin/sh
#
#  prebackup
#  Backup of the CDE configuration data of the user logins root and
#  sxadmin
#  (Home directories /, /export/home/sxadmin, /export/home/bs2admin and #
/export/home/soladmin)
#
BACKUPLIST=/etc/opt/FJSVscsl/backup/CDEbackup/printlist
CDEROOT=/.dt
CDESXADMIN=/export/home/sxadmin/.dt
CDEBS2ADMIN=/export/home/bs2admin/.dt
CDESOLADMIN=/export/home/soladmin/.dt

>$BACKUPLIST

# CDE data of the user root
find $CDEROOT -type f >> $BACKUPLIST 2> /dev/null
find $CDEROOT -type l >> $BACKUPLIST 2> /dev/null

# CDE data of the user sxadmin
find $CDESXADMIN -type f >> $BACKUPLIST 2> /dev/null
find $CDESXADMIN -type l >> $BACKUPLIST 2> /dev/null

# CDE data of the user bs2admin
find $CDEBS2ADMIN -type f >> $BACKUPLIST 2> /dev/null
find $CDEBS2ADMIN -type l >> $BACKUPLIST 2> /dev/null

# CDE data of the user soladmin
find $CDESOLADMIN -type f >> $BACKUPLIST 2> /dev/null
find $CDESOLADMIN -type l >> $BACKUPLIST 2> /dev/null

exit 0
```

This procedure is already sufficient for all configuration data of the CDE interface of the user logins `root`, `sxadmin`, `bs2admin` and `soladmin` to be dynamically determined by `scslbackup` and included in the backup. Where necessary, other user logins should be included (e.g. for the administrator of PRIMEPOWER ServerView).

The data is then restored automatically without requiring any further measures with the command `scslrestore`.

Backing up and restoring manually

If the data is written to a separate DAT tape from the SCS management data, this can be done using the procedure above and the following additional commands:

```
# tar cf /tmp/cde.tar -I /etc/opt/FJSVscsl/backup/CDEbackup/printlist
# tar cf /dev/rmt/0 /tmp/cde.tar
# rm /tmp/cde.tar
```

The data is restored with the following commands:

```
# tar xf /dev/rmt/0 /tmp/cde.tar
# tar xf /tmp/cde.tar
# rm /tmp/cde.tar
```

4.6 Backing up/restoring systems in the partitions

This section describes the procedures for backing up and restoring data for the disk on which the operating system of a partition is located (referred to hereafter as the “system disk”).

In BS2000 partitions, use the PSR tool under *Tools* in PRIMEPOWER ServerView for a convenient backup/restoration of system disks in live operation (see page 218).

Note on PSR:

A PSR backup is carried out by the user for systems without a service contract or can be carried out by a service engineer on behalf of the user against a charge.

For systems with a service contract, the PSR backup is carried out by a service engineer during commissioning or after changes.

4.6.1 Methods

The various options for backing up/restoring data are described below.

Remotely connected tape device

Here system disk data of a partition is backed up/restored using a tape device which is connected to the system console (SMC). In order to be able to use the remote shell functions for this procedure, the remote access (with root access permissions) of the server backing up the data (on the server side) must be allowed to be executed on the SMC of the remote server with the connected tape device. This manual describes only this method.

Locally connected tape device

If it is not possible to execute the root access permissions of the server remotely or if the data on the system disk is not to be transferred via the LAN, the tape device must be connected locally to the server which is carrying out the backup/restore and processing operations.

4.6.2 Data backup

This description assumes a system disk of a partition which is backed up using a tape device (DAT drive) which is connected to the system console (SMC).

Backing up a file system

A file system is backed up with the command `ufsdump`.

The following description shows how the file system is backed up on the tape device of the SMC with `ufsdump`.

Preparations

1. You can determine in the partition the disk device name of the relevant file system as follows:
   a) Display the contents of the file `/etc/vfstab`.
      ```
      # more /etc/vfstab
      ```
   b) Determine and note the name of the file system in the column `mount point`. Check the disk device name of the system disk (in the column `device to mount`). Additional products which may be used, such as Solstice Disk Suite™, Veritas LVM™ or EMC Powerpath™, must be taken into account.
2. Determine the number of tapes needed for data backup:
   a) Log on as the system administrator.
   b) Execute the command `ufsdump S` to obtain the size of the backup file in bytes:
      ```
      # ufsdump S filesystem
      ```
   c) Divide the predicted number of bytes by the storage capacity of a tape to determine the number of tapes required.

      Cartridges of the type “SONY Cartridge DGD-150P DAT-Tape DDS4“ with a length of 150 m and a capacity of 20 GB are used by default in the SX server.
3. Create the data backup plan.
4. To allow the SMC the remote shell function or a remote login, enlist the server and the user ID `root` in the file `/.rhosts` of the server to which the tape device is connected. As an alternative, also keys can be used in the framework of the Secure Shell.

   Example: `<partition-name> root`

Procedure

1. In the partition which is to carry out the data backup the Solaris operating system is now started via the network from the system console:

   ```
   {0} ok boot <LAN controller> -s
   ```

   Here `<LAN controller>` is the alias name of the system console LAN controller. The alias names can be checked in OBP using `devalias`.

   As of the SX140 model series the alias names `net` and `obp-net` can be used by default. As default on SX130 servers these alias names are `net<x>`, where `<x>` is the number of the system board whose onboard LAN interface is connected to the administration LAN. For SX130 servers this is `0`, `2`, `4` and `6` consecutively from the left.

2. Activate the network:

   ```
   # /etc/init.d/inetinit start
   ```

3. Start the RPC service:

   ```
   # /etc/init.d/rpc start
   ```

4. Activate the network interface:

   ```
   # /etc/init.d/inetsvc start
   ```

5. Use the command `fsck` to check the integrity of the file system for which the data backup is carried out.

   Example: for segment `c0t0d0s1`:

   ```
   #fsck -m /dev/rdsk/c0t0d0s1
   ```

6. Confirm the name of the remote tape device. The default name is `/dev/rmt/0`.

7. Insert the write-enabled tape into the tape device.

8. Mount the file system to be backed up temporarily:

   Example: `# mount -F ufs /dev/dsk/c0t0d0s1 /mnt`

9. Create a backup copy of the file system with the command `ufsdump`.

   Insert a new tape in the drive when the relevant prompt appears.

   Example

   Back up local file system `/mnt` on the tape device of the SMC:

   ```
   # ufsdump 0cf <name of the SMC>:/dev/rmt/0 /mnt
   ```

   When using the Secure Shell, the data backup must be carried out with an appropriate combination of the commands `ufsdump`, `ssh` and `dd`.

Example using the Secure Shell

Back up local file system `/mnt` on the tape device of the SMC:

```
# ufsdump 0cf - /mnt | ssh root@<name of the SMC>
"dd of=/dev/rmt/0 bs=64k"
```

10. Note the tape number, status, date, system name and file system name on tape labels for every tape and attach these to the relevant tapes.
11. Restart the partition: `# /usr/sbin/shutdown -y -i6 -g0`

Check

Check the contents of the tape with the command `ufsrestore t` to ensure that the data backup was successful.

Backing up a disk

A disk is backed up with the command `dd`.

The following description shows how a disk is backed up on the remote tape device with `dd` and `rsh` (or `ssh` if the Secure Shell is used).

When using the command `dd`, it is only possible to restore data on a disk with the same formatting as the disk which was backed up.

Preparations

1. Confirm the device name of the disk to be backed up.

   (You can determine the disk device name of the relevant file system as follows.)

   – Display the contents of the file `/etc/vfstab`.

     ```
     # more /etc/vfstab
     ```

     Determine and note the name of the file system in the column `mount point`. Check the disk device name of the system disk (in the column `device to mount`). Additional products which may be used, such as Solstice Disk Suite™, Veritas LVM™ or EMC Powerpath™, must be taken into account.

   – Determine the number of tapes needed for data backup.

   – Log on as the system administrator.

   – Check the size of the target disk in the partition table with the command `format`.

   – Divide the predicted number of bytes by the storage capacity of the tape to determine the number of tapes required.

   – Create the data backup plan.

– Add the partition name and `root` to the file `/.rhosts` of the SMC. As an alternative, keys can be used in the framework of the Secure Shell.

Example: <`partition-name> root`

Procedure

1. In the partition which is to carry out the data backup, the Solaris operating system is now started via the network from the system console:

   ```
   {0} ok boot <LAN controller> -s
   ```

   Here `<LAN controller>` is the alias name of the system console LAN controller. The alias names can be checked in OBP using `devalias`.

   As of the SX140 model series the alias names `net` and `obp-net` can be used by default. As default on SX130 servers these alias names are `net<x>`, where `<x>` is the number of the system board whose onboard LAN interface is connected to the administration LAN. For SX130 servers this is `0`, `2`, `4` and `6` consecutively from the left.

2. Activate the network:

   ```
   # /etc/init.d/inetinit start
   ```

3. Start the RPC service:

   ```
   # /etc/init.d/rpc start
   ```

4. Activate the network interface:

   ```
   # /etc/init.d/inetsvc start
   ```

5. Use the command `fsck` to check the integrity of the file system from which the data backup is carried out with `dd`.

   Example: For segment `c0t0d0s1`:

   ```
   #fsck -m /dev/rdsk/c0t0d0s1
   ```

6. Confirm the name of the remote tape device. The default name is `/dev/rmt/0`.

7. Insert the write-enabled tape into the tape device.

8. Create a backup copy of the file system with the commands `dd` and `rsh` (or `ssh` if the Secure Shell is used).

   Insert a new tape in the drive when the relevant prompt appears.

Example

Back up local files `/dev/dsk/c0t0d0s1` on the tape device of the SMC.

```
# dd if=/dev/rdsk/c0t0d0s1 bs=64k | rsh <name of the SMC> dd of=/dev/rmt/0
bs=64k

   139072+1 records in
   17801280+0 records out
   16228173+3144616 records in
   139072+1 records out
```

When using the Secure Shell the following command can be given:

```
# dd if=/dev/rdsk/c0t0d0s1 bs=64k |  ssh root@<name of the SMC>
"dd of=/dev/rmt/0 bs=64k"
```

Note the tape number, status, date, system name and file system name on tape labels for every tape and attach these to the relevant tapes.

9. Restart the partition:

```
/usr/sbin/shutdown -y -i6 -g0
```

4.6.3 Recovery

This description assumes a system disk which is restored from a tape device (DAT drive) which is connected to the system console (SMC).

Restoring a file system

A file system is restored with the command `ufsrestore`.

The following description shows how the file system is restored from the remote tape device of the SMC with `ufsrestore`.

Preparations

1. Enlist the server name and `root` which execute the restore process in the file `/.rhosts` of the system console and permit remote access.

   Example: <`partition-name> root`

   As an alternative, keys can be used in the framework of the Secure Shell.

Procedure

1. In the partition which is to carry out the data recovery, the Solaris operating system is now started via the network from the system console:

   ```
   {0} ok boot <LAN controller> -s
   ```

   Here `<LAN controller>` is the alias name of the system console LAN controller. The alias names can be checked in OBP using `devalias`.

   As of the SX140 model series the alias names `net` and `obp-net` can be used by default. As default on SX130 servers these alias names are `net<x>`, where `<x>` is the number of the system board whose onboard LAN interface is connected to the administration LAN. For SX130 servers this is `0`, `2`, `4` and `6` consecutively from the left.

2. Activate the network:

   ```
   # /etc/init.d/inetinit start
   ```

3. Start the RPC service:

   ```
   # /etc/init.d/rpc start
   ```

4. Activate the network interface:

   ```
   # /etc/init.d/inetsvc start
   ```

5. Mount a new file system at a temporary mount point:

   Example: `# mount /dev/<device-name> /mnt`

6. Switch to the temporary mount point:

   Example: `# cd /mnt`

7. Secure the tape against write access and insert it in the tape device.

8. Restore the file system from the remote tape device with the command `ufsrestore`.

   Example

   Restore the file system from the tape device of the SMC:

   ```
   # ufsrestore rvf <name of the SMC>:/dev/rmt/0
   ```

   When using the Secure Shell, restore of the file system must be carried out with an appropriate combination of the commands `ufsrestore`, `ssh` and `dd`-

   Example using the Secure Shell

   Restore the file system from the tape device of the SMC:

   ```
   # ssh root@<name of the SMC> "dd if=/dev/rmt/0 bs=64k" | ufsrestore
   rvf -
   ```

9. Delete the file `restoresymtable` generated by the command `ufsrestore` and used in the checkpoint of the restore process.

   Example: `# rm restoresymtable`

Check

1. Switch to the root directory and unmount the newly created file system again.

   Example

   ```
   # cd /
   # umount /mnt
   ```

   Check the new file system:

   Example: `# fsck /dev/rdsk/<device-name>`

2. Create a boot block in the root partition with the command `installboot`:

   Example

   ```
   # installboot /usr/platform/`uname -i` /lib/fs/ufs/bootblk
   /dev/rdsk/<device-name>
   ```

3. Insert a new tape in the tape device of the system console and create a backup copy of the new file system.

   The backup copy of the new file system must be created immediately, as the command `ufsrestore` changes the position of the file and the index entry (`i` node).

4. Restart the system:

```
# /usr/sbin/shutdown -y -g0 -i6
```

Restoring a disk

A disk is restored with the command `dd`. The following describes how data can be restored with the commands `dd` and `rsh` (or `ssh` if the Secure Shell is used).

Preparations

1. Enlist the server name and `root` which execute the restore process in the file `/.rhosts` of the system console and permit remote access.

   Example: <`partition name> root`

   As an alternative, keys can be used in the framework of the Secure Shell.

Procedure

1. In the partition which is to carry out the data recovery, the Solaris operating system is now started via the network from the system console

   ```
   {0} ok boot <LAN controller> -s
   ```

   Here `<LAN controller>` is the alias name of the system console LAN controller. The alias names can be checked in OBP using `devalias`.

   As of the SX140 model series the alias names `net` and `obp-net` can be used by default. As default on SX130 servers these alias names are `net<x>`, where `<x>` is the number of the system board whose onboard LAN interface is connected to the administration LAN. For SX130 servers this is `0`, `2`, `4` and `6` consecutively from the left.

2. Activate the network:

   ```
   # /etc/init.d/inetinit start
   ```

3. Start the RPC service:

   ```
   # /etc/init.d/rpc start
   ```

4. Activate the network interface:

   ```
   # /etc/init.d/inetsvc start
   ```

5. Secure the tape against write access and insert it the remote tape device.

6. Restore the files from the remote tape device with the commands `dd` and `rsh` (or `ssh` if the Secure Shell is used).

   Example

   Restore data from the tape device of the SMC on the local disk (`/dev/dsk/c0t0d0s1`):

   ```
   # rsh <name of the SMC> dd if=/dev/rmt/0 bs=64k | dd
   of=/dev/rdsk/c0t0d0s1 bs=64k

       139072+1 records in
       17801280+0 records out
       17801280+0 records in
       139072+1 records out
   ```

   When using the Secure Shell the following command can be given:

   ```
   # ssh root@<name of the SMC> "dd if=/dev/rmt/0 bs=64k" | dd
   of=/dev/rdsk/c0t0d0s2 bs=64k
   ```

Check

1. Check the new file system:

   Example: `# fsck /dev/rdsk/<device-name>`

2. Restart the system:

   ```
   # /usr/sbin/shutdown -y -g0 -i6
   ```

4.7 XSCF

4.7.1 Functionality of XSCF

As of the SX150 model series the System Management Console (SMC) on the basis of a PRIMEPOWER250 system is equipped with the Extended System Control Facility (XSCF). XSCF is a system monitoring and control facility which runs on its own processors in the SMC and offers a user interface as long as it is connected to the power cables of the SMC.

The options of XSCF can be used on SX systems as of the SX150 model series. XSCF offers the following functions, among others:

– Remote switching the SMC on/off

– Operation of the SMC console from a remote system

– Enhanced monitoring and logging functions for monitoring the SMC hardware components. This enables XSCF to be integrated into a monitoring concept by means of SNMP traps to a management station and/or by means of e-mails to a system administrator.

A description of the functions and configuration of XSCF is provided in the document “PRIMEPOWER450/250 Extended System Control Facility (XSCF)” [32].

4.7.2 Access options to XSCF

The table below provides an overview of the various access options to XSCF.

Function	Description	Serial port	SCF-LAN Ethernet
XSCF Shell	– Monitors the server. The status of the server can be checked. – Server power can be controlled from a remote server – Displays the server configuration. The internal configuration of the server can be checked.	S	S
XSCF Web-Funktion	Provides the same functions as the XSCF shells, but provides graphical displays for easier operation.	-	S
Mail Report	Reports errors and failures by e-mail so that immediate measures can be taken.	-	S
SNMP Trap Report	Enables consolidated control for server administration in conjunction with SNMP manager.	-	S
Standard Console	Enables access to the system console and/or OBP prompt.	S	S

Table 2: Overview of the access options to XSCF

Explanation of the table

– The value S (=supported) specifies whether the function supports a serial port and/or SCF-LAN Ethernet. If the support is not provided the column concerned contains “-”.
– The XSCF shell designates a Command Line Interface (CLI) on a PC connected with XSCF.
– Standard Console designates the system console which can be reached from a PC connected with XSCF with write authorization.
– The XSCF Web functions can be accessed via the Internet. This option is described briefly in the section “Accesses to XSCF” on page 121. For further information please refer to the documentation “PRIMEPOWER450/250 Extended System Control Facility (XSCF)” [32].

4.7.3 Configuration of XSCF

XSCF is configured via the *Machine Administration Menu* of the SMC which is started with the command below:

```
/opt/FJSVmadm/sbin/madmin
```

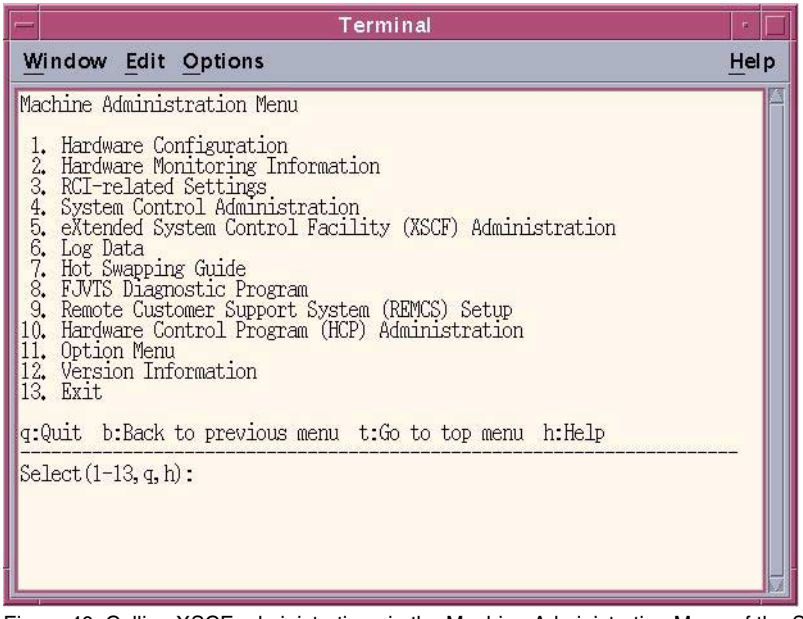

Terminal
Window Edit Options Help
Machine Administration Menu
1. Hardware Configuration
2. Hardware Monitoring Information
3. RCI-related Settings
4. System Control Administration
5. eXtended System Control Facility (XSCF) Administration
6. Log Data
7. Hot Swapping Guide
8. FJVTS Diagnostic Program
9. Remote Customer Support System (REMCS) Setup
10. Hardware Control Program (HCP) Administration
11. Option Menu
12. Version Information
13. Exit
q:Quit b:Back to previous menu t:Go to top menu h:Help
Select(1-13,q,h):

Figure 40: Calling XSCF administration via the Machine Administration Menu of the SMC

When you select 5 *eXtended System Control Facility (XSCF) Administration* the following window opens:

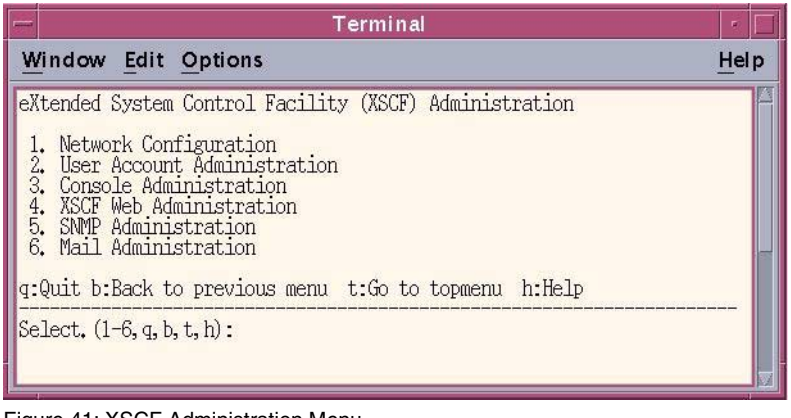


Figure 41: XSCF Administration Menu

Configuration of XSCF comprises the following steps:

- Network Configuration (mandatory):
  Definition of the access from XSCF to the network (IP address, XSCF host name, subnet mask, name server, etc.)
- User Account Administration (mandatory):
  For access to the XSCF shell separate access IDs must be created in XSCF to which a different scope of commands can be made available depending on the group affiliation. Two groups, `root` and `others`, with permanently defined rights are provided for this purpose.
- Console Administration (mandatory)
  Definition of the access options to the SMC (standard console, read-only console, XSCF shell). Definition of the access type from XSCF to the console (via LAN/serial). Connection via LAN is recommended.
- XSCF Web Administration (optional):
  Configuration of the access to the XSCF Web functions (Remote Panel, history of the LCD messages, power/error logging etc.). Access via a Web browser can be permitted in read/write or in read-only mode. Furthermore the servers which are granted access rights to the Web functions can be defined.
- SNMP Administration (optional):
  Configuration of an SNMP agent in XSCF including its MIB information.
- Mail Administration (optional):
  Configuration of a Mail Report function.
- SSH Administration (optional):
  Configuration of SSH is performed by means of special administration commands via the CLI.

4.7.4 Accesses to XSCF

Access to the XSCF shell

The connection to the XSCF shell is, for example, set up using Exceed (see the section “Configuration and operation” on page 135) via Telnet port 8010 or SSH port 8810. In this case the last error message is output. At any one time only one connection with write authorization is possible via the LAN or serial port.

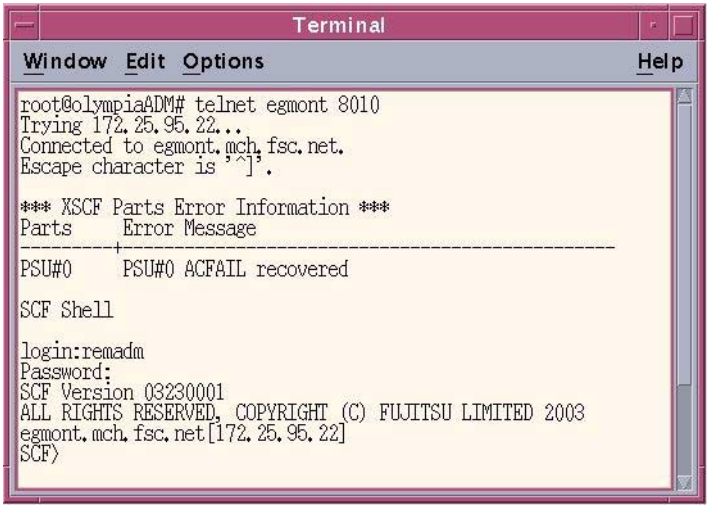


Figure 42: XSCF shell

The `help` entry requests an overview of the commands of the XSCF shell:

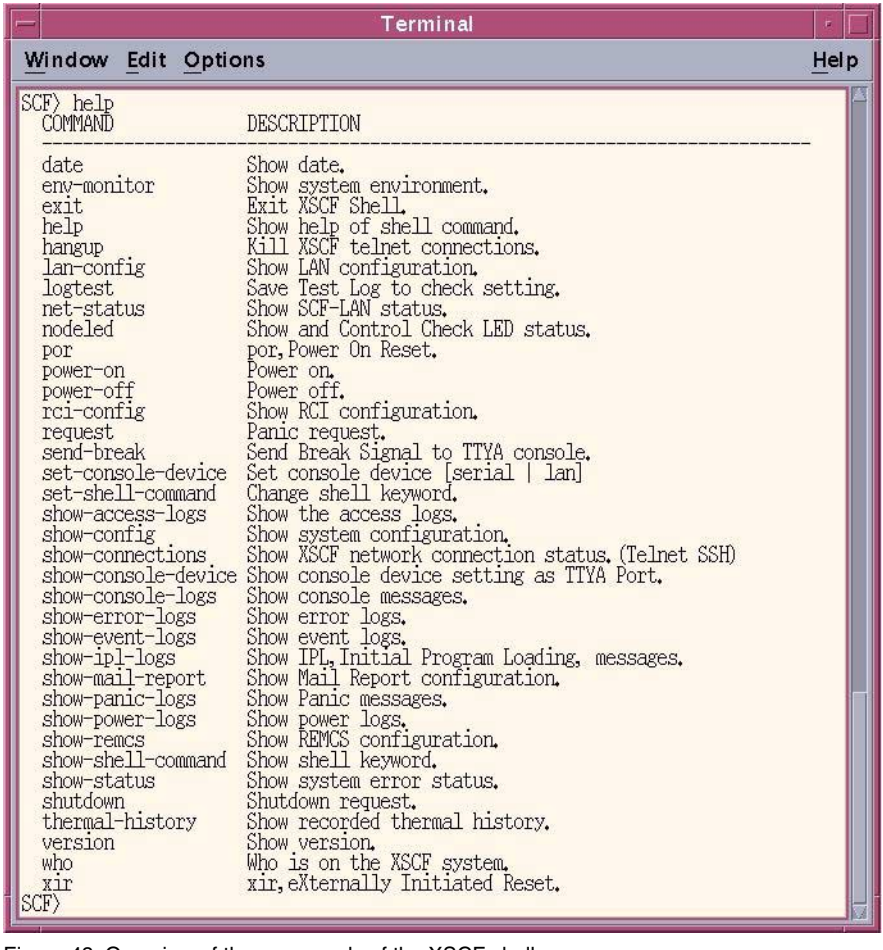

Terminal
Window Edit Options Help
SCF> help
COMMAND DESCRIPTION
date Show date.
env-monitor Show system environment.
exit Exit XSCF Shell.
help Show help of shell command.
hangup Kill XSCF telnet connections.
lan-config Show LAN configuration.
logtest Save Test Log to check setting.
net-status Show SCF-LAN status.
nodeled Show and Control Check LED status.
por por, Power On Reset.
power-on Power on.
power-off Power off.
rci-config Show RCI configuration.
request Panic request.
send-break Send Break Signal to TTYA console.
set-console-device Set console device [serial | lan]
set-shell-command Change shell keyword.
show-access-logs Show the access logs.
show-config Show system configuration.
show-connections Show XSCF network connection status. (Telnet SSH)
show-console-device Show console device setting as TTYA Port.
show-console-logs Show console messages.
show-error-logs Show error logs.
show-event-logs Show event logs.
show-ipl-logs Show IPL, Initial Program Loading, messages.
show-mail-report Show Mail Report configuration.
show-panic-logs Show Panic messages.
show-power-logs Show power logs.
show-remcs Show REMCS configuration.
show-shell-command Show shell keyword.
show-status Show system error status.
shutdown Shutdown request.
thermal-history Show recorded thermal history.
version Show version.
who Who is on the XSCF system.
xir xir, eXternally Initiated Reset.
SCF>

Figure 43: Overview of the commands of the XSCF shell

Access to the console

The remote connection to the XSCF console with write authorization is carried out using, for example, Exceed via Telnet port 23 or SSH port 22. At any one time only one connection with write authorization is possible via the LAN or serial port. Some further connections with write authorization are possible via the ports 8011 and 8013.
To permit input/output to be redirected to the remote screen, a few configuration measures must be taken beforehand (see section 3.5 of the documention on “PRIMEPOWER450/250 Extended System Control Facility (XSCF)” [32]).

Access via Web browser

Access to XSCF is implemented in the Web browser at URL *https://<xscf-hostname>*. The XSCF host name was defined when XSCF was configured. XSCF is assigned a separate network connection with a separate network address and a separate host name. Network access to the SMC is not affected by this.

After login an initial screen appears on which the XSCF function can be selected. The following XSCF functions are available via a Web browser:

Page	Description
Top	It's the top page of XSCF. Allows user to call the authentication page or to specify XSCF of an other server.
Authentication	Allows users to log in to XSCF using an XSCF account.
Index	Allows users to select a desired page when login has been successful:
– Remote-control panel	Displays an image of the server's operation panel. If settings of the XSCF Web functions permit the remote operation, the switches on the panel, with the exception of the mode switch, can be handled. *Note* To perform switching operations, log in XSCF with root-level authority is necessary.
– Server status	Displays the server status. Specifying a unit displays the status information for this unit..
– Access status	Enables the logins to the XSCF Web function to be viewed.
– Change of password	Enables the password of the XSCF account to be changed.
– Error log	Displays the XSCF error log.
– Power log	Displays the XSCF Power log.
– Message history	Displays the panel message history.

Table 3: XSCF functions available via a Web browser

5 Functions of the SX server entry-level models

5.1 Switching on/off functions

The SX server entry-level models are switched on and off via the power button on the control panel of the system unit:

- To switch on, press the power button once. The X2000 carrier system (in the normal setting of the mode selection switch to LOCK) and the operating system BS2000/OSD for activated automatic IPL (see “BS2 KVP” on page 215) are then loaded.
- To switch off, press the power button twice in succession. BS2000/OSD is then terminated with shutdown, the X2000 carrier system is terminated and the system unit switched off.

You will find details on switching on/off via the control panel in the SX1xx Operating Manual [2] for the SX entry-level servers.

Time-controlled switching on/off is also possible by means of software functions on the machine administration menu. This is described in the section “Timed switching on/off of the server” on page 128.

5.2 Machine Administration menu

The machine administration menu is an application in the X2000 carrier system environment. This menu is used for server system operation and maintenance.

To call the function in an SX server entry-level model, see also the section “Machine Administration Menu (for entry-level models only)” on page 39 and section “Calling terminal instances” on page 40.

The functions on the machine administration menu are:

– Hardware status check
– Logging data analysis
– Hardware error detection

The information collected can be displayed in the hardware configuration. The system administrator can be notified automatically when maintenance work is required based on the “product life management” function.

This enables preventive maintenance to be carried out and thereby improves system availability.

The machine is administered from the machine administration menu (alphanumeric interface).

You will find detailed information on the functions of the machine administration menu in the manual “Machine Administration Guide“ [8], which is available in PDF format on the data carrier of the enhanced support facility (ESF).

The following two machine administration functions are explained in more detail in the sections below: Notification of the system administrator and timed switching on/off.

5.2.1 Notification of the system administrator

The settings for outputting notifications by e-mail are defined in the machine administration menu under *Setting Monitoring Notification Information*:

1. In the *Machine Administration Menu,* select the menu entry *Hardware Monitoring Information*.
2. Select the menu entry *Setting Monitoring Notification Information.*

The following screen is displayed:

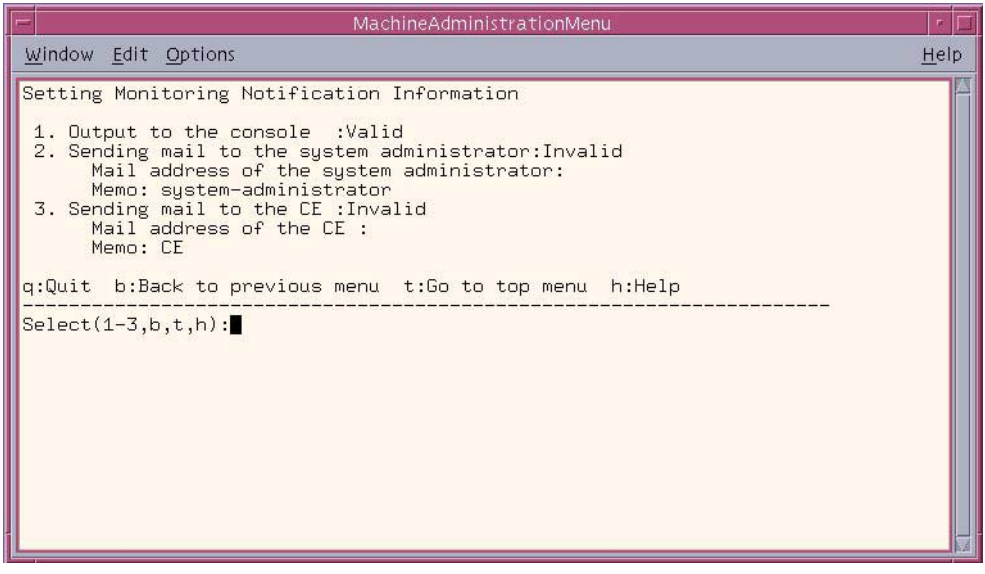

MachineAdministrationMenu
Window Edit Options Help
Setting Monitoring Notification Information
1. Output to the console :Valid
2. Sending mail to the system administrator:Invalid
Mail address of the system administrator:
Memo: system-administrator
3. Sending mail to the CE :Invalid
Mail address of the CE :
Memo: CE
q:Quit b:Back to previous menu t:Go to top menu h:Help
Select(1-3,b,t,h):

Figure 44: Machine Administration Menu *Setting Monitoring Notification Information*

You can now set the menu as follows:

– Display error messages on the system console (activated as default)
– Notify the system administrator by e-Mail

► Establish whether the system administrator is to be notified by e-mail.

If notification is specified, enter further information about the system administrator, e.g. his/her name and e-mail address.

► Establish whether the service engineer responsible is to be notified by e-mail.

If notification is specified, enter further information about the service engineer, e.g. his/her name and e-mail address.

If notification is sent by e-mail it is necessary to enter an SMTP server in the file `/etc/hosts`, to which the mails will be sent. This entry must be created in the following form:

```
<IP address> <server name> mailhost
```

The name `mailhost` is preset and instructs Solaris/X2000 to send mails to this address.

5.2.2 Timed switching on/off of the server

The automatic power control system (APCS) automatically switches the server on or off – based on a number of switching on/off schedule entries.These entries form the system schedule.

When the server is switched on, the X2000 carrier system is automatically started if the mode selection switch of the system is in the *LOCK* position (normal mode) (see SX100 Operating Manual [2]. When the server is switched off the operating systems are shut down in this switch position. This is also understood to mean the start-shutdown of the X2000 carrier system.

For automatic IPL (Initial Program Load) of the BS2000 when the server is switched on (see "Configuration of automatic IPL (G)" on page 215) or for automatic shutdown of the BS2000 (see "Evaluation of shutdown (X)" on page 216) when switching off the server, the relevant entries must be made in the KPV menu.

The administration of the APCS in the machine administration menu of an SX server entry-level model is for the most part similar to the corresponding function on the system management console in SX servers with SMC.

You will find details on the administration of the APCS in the section "Switching the server on/off on a scheduled basis" on page 66 or in the manual "Machine Administration Guide" [8].

5.3 Integrated console

To use the integrated console, open the rack door and pull out the drawer with the TFT monitor and keyboard. Fold the monitor into the upright position and switch on.

When the monitor is in the upright position it is not possible to push in the drawer.

The rack console has two main functions:

– When the system is switched on/off the messages from the Solaris carrier system with X2000 can be monitored.
– When the carrier system is loaded the Solaris user interface Common Desktop Environment (CDE) is made available.

The functions of the Common Desktop Environment are explained in general terms in the chapter “Functions of the Solaris-CDE interface” on page 27, and the calling of the preinstalled applications BS2000 console, BS2000 dialog, PRIMEPOWER ServerView and machine administration are explained in the section “Calling terminal instances” on page 40.

Details on the individual functions are given in the following chapters and sections:

– BS2000 console (KVP): see section “BS2000 console mode” on page 159
– BS2000dialog (emds): see section “EM9750 mode” on page 182
– PRIMEPOWER ServerView: see chapter “The X2000 user interface” on page 195
– Machine Administration: see section “Switching on/off functions” on page 125

To shutdown the rack console, shutdown the CDE interface (select the EXIT button in the CDE front panel) or the lock the display (select the LOCK button [lock symbol] on the CDE front panel.

The monitor must then be switched off, folded back into the drawer and the drawer pushed in.

The drawer has a safety clip on the runners which must be pushed in to release the drawer.

5.4 LAN console and RCA

The operation of the SX server entry-level models via the LAN console and remote communication adapter (RCA) is similar to that of SX servers with SMC. The main difference is in the software used to operate the physical consoles of the system units.

The LAN console software xscon for making a connection to the physical console of the SX server entry-level model is installed on the LAN console. You will find details on installing, configuring and operating in the manual “LAN Console and System Management Console (SMC)“ [9].

The user interface Common Desktop Environment is available on the LAN console for operating an SX server entry-level model (see chapter “Functions of the Solaris-CDE interface” on page 27).

The CDE actions for operating an entry-level model are created when the service is installed by your service provider.

In addition to the icons for BS2000 console, BS2000 dialog, PRIMEPOWER ServerView and machine administration, an action for calling xscon is available for opening a console window for the physical console.

5.5 Time cluster with external time servers

In principle, the use of an external time server in BS2000 is not necessary because BS2000 is automatically synchronized with the Solaris time of the X2000 carrier system. When requirements relating to accuracy of the time reference used are tightened, however, the use of an external timer for X2000 is recommended.

On entry-level models the X2000 carrier system is a direct NTP client of an NTP server in the network.

If an external time server is used, the NTP configuration file /etc/inet/ntp.conf must be created and the IP address of this server must be made known to the system. For this purpose the file must contain at least the following entries:

```
server xxx.xxx.xxx.xxx prefer          # IP address of the NTP server
server 127.127.1.0
fudge  127.127.1.0 stratum 5           # Select a medium stratum value
driftfile /var/ntp/ntp.drift
```

Other entries are optional (see the example in the section “NTP client (partitions)” on page 95).
The changes in the NTP configuration file become effective automatically the next time Solaris starts up. In order to activate changes in the NTP configuration file during ongoing operation, the administrator must start the NTP daemon again:

```
#/etc/rc2init.d/S74xntpd stop <RETURN>
#/etc/rc2init.d/S74xntpd start <RETURN>
```

WARNING!
This action must not be performed when the BS2000 system is running because a time jump may then occur.

For the diagnostic commands *ntpq*, *xntpdc*and *ntptrace* see the section “NTP diagnostic commands (for the SMC and the partitions)” on page 95.

6 Remote operation via PC

An SX server is operated centrally via the System Management Console (SMC) or via the integrated console or LAN console. In order to enable separate operation outside the computer center, the user interface of the current console must be made available to the center. This is done via PCs with a LAN connection to the current console (and, where necessary, the server partitions); the PCs have access to the system user interface via an X server.

In this case, the same administration functions are used as those available directly on the console.

It is also possible to use an emulation keyboard to facilitate the operation of the BS2000 dialog functions on the PC. The BS2000 dialog is operated either via a 97801 emulation using SINIX-TE directly on the PC (not possible if the Secure Shell is used), or via a 9750 emulation on the PC.

6.1 Recommended hardware and software configuration

PC system

A PC system equipped with at least a 500 MHz Pentium III processor, 256 MB of RAM and a LAN interface should be used as the administration workstation.

PC console

The PC console must possess a minimum screen resolution of 1024x768 in order to be able to present all the displayed information in legible form.

Personal computers from the Scenic Professional series or workstations from the Celsius or Primergy series are recommended. If you have any queries concerning your hardware configuration, please contact a Fujitsu Siemens Computers sales representative.

Operating system

A PC based on Microsoft Windows® is recommended for operating the SX server.

Windows 95, 98, ME, 2000, NT 4.0 and XP are supported as operating systems.

No particular version is recommended at this point because the strategy of the customer cannot generally be considered here.

Software products

The software products mentioned below support the current Windows versions quoted.

- X-Servers

  Hummingbird Exceed is recommended as the X11 Windows server to be used. The current V8.0 version supports the Microsoft Windows versions 95/98/ME/XP Home Edition or Windows NT 3.5/4.0, Windows 2000 and XP Professional Edition.

  If stability problems are encountered in the X server when operating the SX server, an online update of the version can be performed (*Start -> Programs -> Hummingbird Connectivity -> Product Administration -> Update Hummingbird Exceed*).

- Java machine

  A virtual Java machine (Java Runtime Environment JRE; PRIMEPOWER ServerView requires JRE as of Version 1.4.0) is required for operating PRIMEPOWER ServerView. If this is not available, an installation version can be loaded into a selected directory when starting PRIMEPOWER ServerView from the server by following the instructions. After installation, the virtual Java machine will be active when you start the browser.

  The browser used must support this virtual Java machine.

  When you install the Java Runtime Environment the Java Web Start is also installed on the PC. As an alternative to starting from the browser or via an icon for a PC application, PRIMEPOWER ServerView can also be started by the Java-Web-Start application.

- Other add-on software:

  – SINIX-TE is recommended for support of an emulation keyboard in BS2000 dialog mode. The current version (5.0) supports operation in both the workstation and terminal server variants of this mode. For this to be possible, you must be running Windows NT 4.0 or Windows 98 or higher. SINIX-TE cannot be deployed in combination with the Secure Shell.

  – 9750 emulation for use of the BS2000 dialog.

6.2 Configuration and operation

This section describes the configuration and operation of Exceed, PRIMEPOWER ServerView, SINIX-TE and the 9750 terminal emulation.

Exceed

The configuration of the Exceed X server is described below. The X server is used to access the CDE user interface of the current console.

The X server is configured using the Xconfig program. This can be started via a corresponding entry in the Windows start menu (*Start -> Programs* -> *Hummingbird Connectivity* -> *Exceed* -> *Xconfig*).

Xconfig start window:

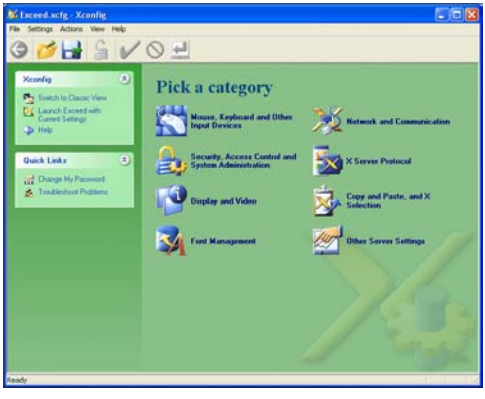


Figure 45: Xconfig: Start window

You must make the following entries in the program window:

1. Select *Network and Communication.* The following window will open:

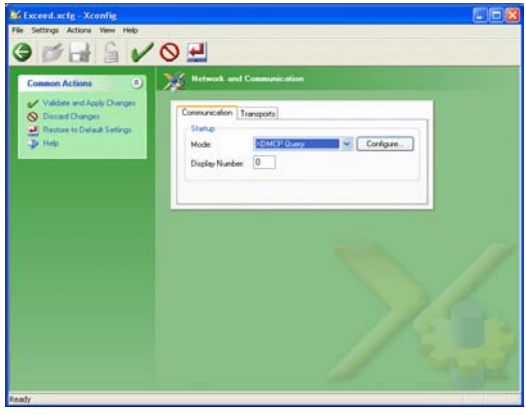


Figure 46: Xconfig: Network and Communication window

You make the following entries in this window:

- Mode = `XDMCP-query`
- Display Number = `0`

Next, click the *Configure...* button next to *Mode*. Another window now opens:

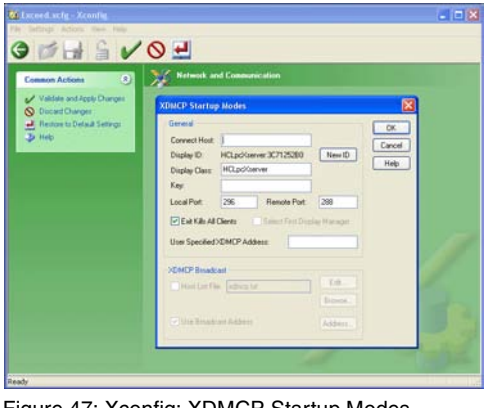


Figure 47: Xconfig: XDMCP Startup Modes

In the window *XDMCP Startup Modes* you must enter the DNS name or IP address of the SMC or the entry-level model under *Connect Host* in the *General* box.

If you do not enter any information at this point, when you start Exceed (from V8.0 onwards) a list of the reachable computers will be displayed and you can dynamically select a computer from this.

Click the *OK* button or the *Validate and Apply Changes* button to confirm your entries. Click the *OK* button to return to the main menu.

You have now completed the basic configuration for console access.

2. Optional: Select *Display and Video*

   Display and Video can be started in the main menu optional.

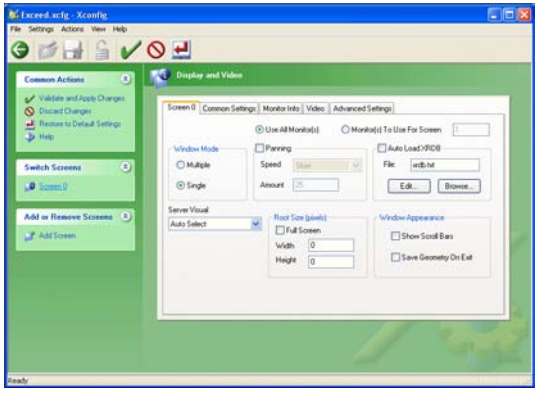


Figure 48: Xconfig: Display and Video

Here you can set the window mode to *Multiple* (each X11 application occupies a separate Microsoft Windows window) or *Single* (all X11 applications are displayed in the same Microsoft Windows window. A Unix Windows Manager runs).

We recommend that you use the *Single* window mode because it is easier to use.

3. Optional: Select *Security, Access Control and System Administration.*

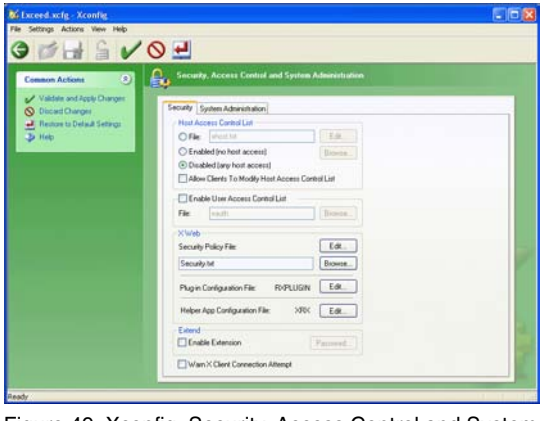


Figure 49: Xconfig: Security, Access Control and System Administration

You can make the X server security settings in this window. As default, the *Host Access Control List* is deactivated, i.e. all servers can send windows to the X server.

This possibility can be restricted to certain servers (only the SMC, the partitions of the SX server, the SKP-SR and the entry-level model). To do this, you must select *File* under *Host Access Control List* and edit the file xhosts.txt.

In this file, you should enter the server names or IP addresses of servers which are to be authorized to display windows on the X server:

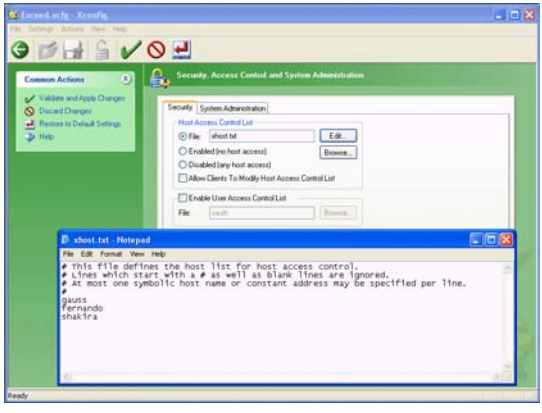


Figure 50: Xconfig: Editor

Exceed is now fully configured.

You call the X server via the Xconfig main menu or by entering Exceed in the Start bar (*Start -> Programs* -> *Hummingbird Connectivity* -> *Exceed -> Exceed*).

Figure 51: Exceed: Start window

After the start screen has been displayed, you see the login screen for the *System Management Console*:

Figure 52: CDE login screen

After you have logged in, you can use the CDE desktop in exactly the same way as at the console:

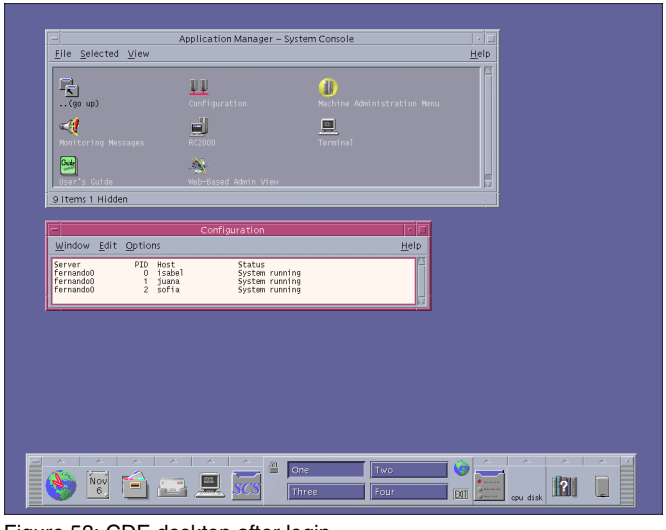


Figure 53: CDE desktop after login

PRIMEPOWER ServerView Suite

When the PRIMEPOWER ServerView Suite is started, after the user interface is loaded first of all the name of the Management Server is queried on which the PRIMEPOWER ServerView Suite is to be started, and also the user ID with the associated password. You are informed if further applications for PRIMEPOWER ServerView Suite are available for downloading on the server. You are recommended to install these now. After they has been installed PRIMEPOWER ServerView Suite must be restarted. The welcome screen of PRIMEPOWER ServerView Suite is then displayed.
PRIMEPOWER ServerView can be started in 3 various ways:

1. Starting PRIMEPOWER ServerView via a call in the browser

   Call PRIMEPOWER ServerView on the SMC or server by entering the PRIMEPOWER ServerView URL in the following format:

   `http://<Servername>:8883`, also e.g. `http://bari1:8883`

   This URL can be stored in the bookmarks of the browser.

   Here port number 8883 effects the call via Java Web Start.

   The calling of PRIMEPOWER ServerView can then be selected on this page in the write or read mode.
   The PRIMEPOWER ServerView Suite/DomainAdmin manual and some products such as Java Plugin/JRE 1.4 can also be downloaded there in the version which matches PRIMEPOWER ServerView Suite.

   When PRIMEPOWER ServerView Suite is started for the first time via the browser a window appears in which a link can be created on the desktop or in the start menu for PRIMEPOWER ServerView.

   If you have established a link on the desktop or start menu you can in future start the PRIMEPOWER ServerView Suite via this link.

2. Starting PRIMEPOWER ServerView with Java Web Start

   Java Web Start itself offers the method for starting PRIMEPOWER ServerView via the application manager of Java Web Start:

   If PRIMEPOWER ServerView has already been started at least once you will find it in the application manager of Java Web Start. To display the downloaded applications, click in the menu bar on *Applications - Downloaded applications*.

   Next, mark an application and click *Start* to start PRIMEPOWER ServerView from the application manager.

Wherever possible Java Web Start always loads the application from the cache and at the same time performs a background check on the server for updates. If there are updates, the user is informed in a window and the update is automatically loaded at the time of the next start.

You will find more information on operating PRIMEPOWER ServerView in the manual "PRIMEPOWER ServerView Suite V2.2 – System Administration within a Domain" [5].

3. Start of PRIMEPOWER ServerView as installed PC application via the start menu or via a desktop icon

   After you have input the URL of PRIMEPOWER ServerView on the SMC or the server and the port number 8883 in the format

   `http://<server-name>:8883`, i.e. for example `http://bari1:8883`

   the installation program can also be installed onto the PC for a Win32 application of PRIMEPOWER ServerView. The self-extracting files install themselves without further user input. After the installation program has run you can start the application via *Start -> Programs -> PRIMEPOWER ServerView Suite -> PRIMEPOWER ServerView Suite*, or create an icon for the start of PRIMEPOWER ServerView on your desktop.

   As of Version 2.2A10 a version-dependent dynamic loading function of the applications of the graphical user interface is offered (e.g. *Bs2Devices*). This loading function works correctly only if PRIMEPOWER ServerView Suite Version ≥ 2.2A10 is installed on the server addressed.

   When the PRIMEPOWER ServerView Suite is started the versions of the applications loaded on the PC are compared with those on the server addressed (SMC or partition) and, if required, applications which are not yet present are loaded (installed). In this case a box with the following text appears:

   "*There are further applications available on the server. It is recommended to install them on your client now. Please restart the user interface afterwards!*"

   To load click on *Install*. PRIMEPOWER ServerView loads the new applications and terminates. The new applications are available after you have restarted PRIMEPOWER ServerView.

   Details on operating the PRIMEPOWER ServerView Suite are provided in the manual "PRIMEPOWER ServerView Suite V2.2 – System Administration within a Domain" [5].

   If it is not possible to start an application which you have loaded on your PC, deinstall the PRIMEPOWER ServerView Suite on the PC using the menu *Start -> Programs -> PRIMEPOWER ServerView Suite -> Uninstall PRIMEPOWER ServerView Suite* and delete the installation directory (with the standard installation this is the directory `C:\Program Files/Fujitsu Siemens Computers/WebSysAdmin`).

SINIX-TE

Optional it is possible to use an emulation keyboard to facilitate the operation of the BS2000 dialog functions. It is necessary to run an appropriate terminal emulation to support this keyboard.

We recommend that you use SINIX-TE to emulate a 97801 terminal. However, SINIX-TE cannot be deployed in combination with the Secure Shell.

To configure the BS2000 dialog, you must use the predefined X2000 login em9750 in the BS2000 partitions.

To configure access, you must first call SINIX-TE (*Start* -> *Programs* -> *SINIX-TE* -> *Start Terminal*) and then select the menu *Settings* and -> *Host…*.

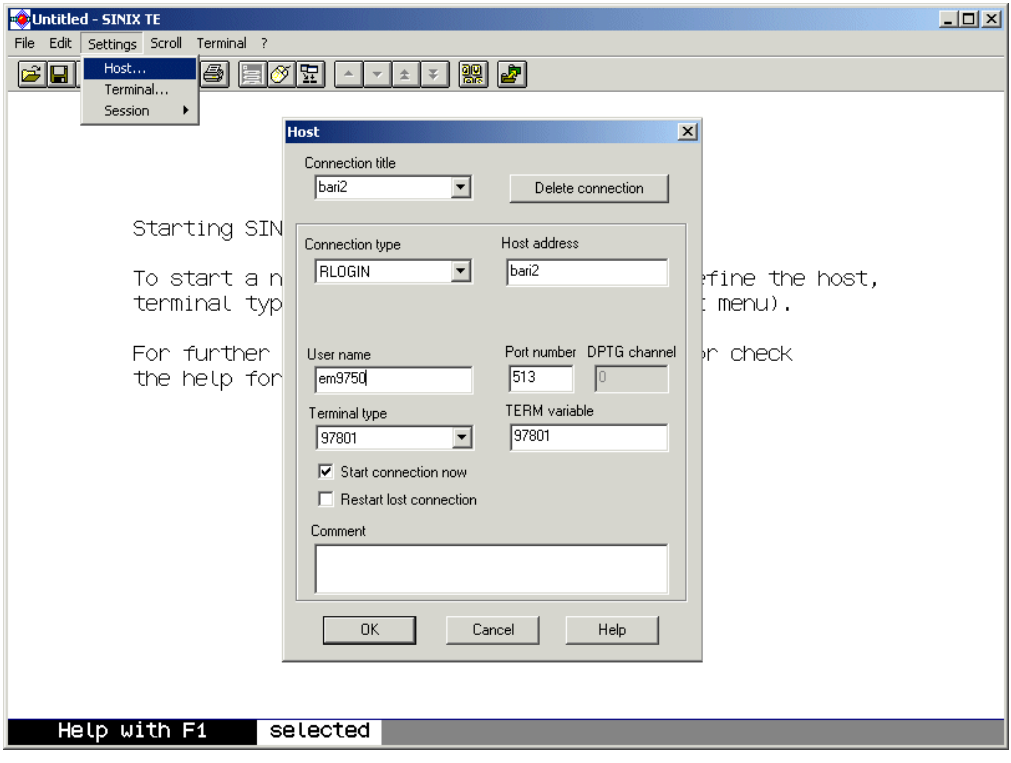


Figure 54: SINIX-TE window

You must make the following entries in the host window that now opens:

– Connection name, preferably the same as the server name
– Set the connection type to RLOGIN
– Server name (DNS name or IP address of the BS2000 partition)
– The user name em9750

After you have clicked *OK* to confirm, the selected connection is opened.

Once the connection has been tested to ensure that the server name/IP address has been entered correctly you can save the connection. To do this, open the *File* menu and select *Save as…*. You must now enter a file name, which should preferably mirror the connection's server name.

In future, you can reactivate the connection without entering this data by choosing *File* -> *Open*.

9750 emulations

9750 emulations from a variety of manufacturers are often used for BS2000 dialog operation. The configuration for the operation of the SX business server is no different from that of other BS2000 business servers and is the customer's responsibility.

6.3 Access with Secure Shell

If you wish to use Secure Shell (SSH) to access SX servers you will first have to make some preparations on the server and client sides. These preparations include installing and configuring the openSSH software on the server side (on the SMC and the partitions). The openSSH software is provided on the CONTROL² CD (on the SMC as of the SX150 model series the Secure Shell software is integrated in Solaris and does not need to be installed, but it must be configured).

It will also be necessary to install an ssh client software on the client side. This can then be used to set up a tunnel for the X11 forwarding for use together with an X server such as Exceed™. These options are described below in this chapter.

6.3.1 Installing OpenSSH

The Secure Shell software must be installed on the partitions and on the system running the user interface which administers the server. On SX servers with SMC, this is the SMC; on entry level models, this is the server itself; where a LAN console is used, this is the LAN console.
OpenSSH must be installed on:

– the BS2000 partitions
– the Solaris partitions up to and including V8
– the SMC up to and including the SX140 model series

No special installation is required for the Secure Shell software on Solaris partitions as of V9 and on the SMC as of the SX150 model series. It is installed when the Solaris software is installed.

To install OpenSSH, insert the CONTROL² CD in the DVD/CD-ROM drive. The CD will then be mounted by the Solaris Volume Manager (directory `/cdrom/cdrom0`).

The installation consists of two steps:

1. Installation of the solaris patch 112438-01 (`/kernel/dev/random`-Patch).
2. Installation of OpenSSH.

   ► At the graphical user interface for your system, log on for the installation procedure with the user ID `root` (CDE, see chapter “Functions of the Solaris-CDE interface” on page 27). Open a terminal window (Front Panel – This Host) to continue with the installation activities.

- To install the patch 112438-01 first of all check whether it is already installed (using `patchadd -p | grep 112438-01`). If it is not installed, switch over to the directory `/cdrom/cdrom0/products` and install the patch using `patchadd 112438-01`. When you have installed the patch, reboot the system with `init 6`.
- To install openSSH, switch over to the directory `/cdrom/cdrom0` and call up the graphical installation program with `/installer_Open_Software`.
- Follow the instructions given by the installation program. In the form *Product Selection*, select the *Default Install*: setting for the product “OpenSSH Secure Shell”.

Figure 55: Installing OPEN SOFTWARE

For the other products, select the *No Install* setting.

- At the end of installation the software is installed in the directory `/opt/SMAWPlus`.
- Remove the CONTROL² CD from the drive with the `eject` command.

6.3.2 Configuring the OpenSSH daemon

Before you can use the software just installed you must configure the ssh daemon for X11 forwarding. To do this, on the BS2000 partitions and on the SMC of the model series up to and including SX140 edit the file `/opt/SMAWPlus/etc/sshd_config` or, on the SMC as of the SX150 model series, the file `/etc/ssh/sshd_config` as follows:

- If they exist, change the lines

  ```
  #X11Forwarding no
  #X11DisplayOffset 10
  #X11UseLocalhost yes
  ```

  to these or insert the relevant lines:

  ```
  X11Forwarding yes
  X11DisplayOffset 10
  X11UseLocalhost yes
  ```

- Next, add a new line with this content:

  ```
  XAuthLocation /usr/openwin/bin/xauth
  ```

- Restart the active ssh daemon, using the following call:
  On the BS2000 partitions and on the SMC up to and including SX140:

  ```
  /etc/init.d/openssh-SMAWPossh restart
  ```

  As of SX150 on the SMC:

  ```
  /etc/init.d/sshd restart
  ```

  This will activate the changes.

This operation completes installation and configuration on the target system.

6.3.3 Configuring the PC client side

Once all the server side preparations for the use of Secure Shell have been completed, the next step is to prepare the administration PC so that the X server can be controlled by Exceed via the Secure Shell protocol.We recommend that you use the PuTTY[1] terminal emulator software to build an X11 tunnel or a port forwarding.

PuTTY is a terminal emulator (xterm) for Microsoft operating systems which enables setting up of a connection via ssh. The software does not require a license[2] for business use and is available from the PuTTY homepage[3].

PuTTY makes it possible to control the system via the ready-to-run xterm emulation and also has functions enabling the use of ssh functions such as X11 forwarding and “Executing commands on a remote host”.

PuTTY can be used with an X server to create a password-protected connection to an SX server from a workstation running a Microsoft operating system.

6.3.3.1 Configuring the administration PC for Exceed use via Secure Shell

X-Server

Start the X server in the passive mode.

Use Xconfig and select the setting *Communication – Passive*. Set the display number to `1`.

In the *Screen Settings* under *Display and Screen*, set the window mode to *Single*. Under *General Settings,* reset the entries *Activate server reset* and *Exit at server reset*.

Access to the DISPLAY should be restricted to applications which run on the local work station (set the entry in `xhost.txt: only localhost`). This will ensure that DISPLAY can only be accessed via Secure Shell. Next, under *Security* go to the Host Access Control List and activate the file `xhost.txt`.

The remaining settings (keyboard, fonts) will be taken from Exceed via Xconfig (for more details, see the section “Configuration and operation” on page 135 and the online Exceed User's Guide).

1. Homepage: http://www.chiark.greenend.org.uk/~sgtatham/putty/
2. The PuTTY executables and the source code are available under the MIT license. The MIT license is similar to the BSD license. This license is Open Source certified and conforms to the Debian Free Software Guidelines. Anyone, including businesses, can use PuTTY without restrictions; it can be used free also for commercial purposes.
3. http://the.earth.li/~sgtatham/putty/latest/x86/putty.exe

PuTTY

This section describes how to configure PuTTY in order to build an X tunnel to the server and to start the user interface from the server.

In the first window which appears when you start PuTTY, enter the server name and the protocol to be used (in this case SSH).

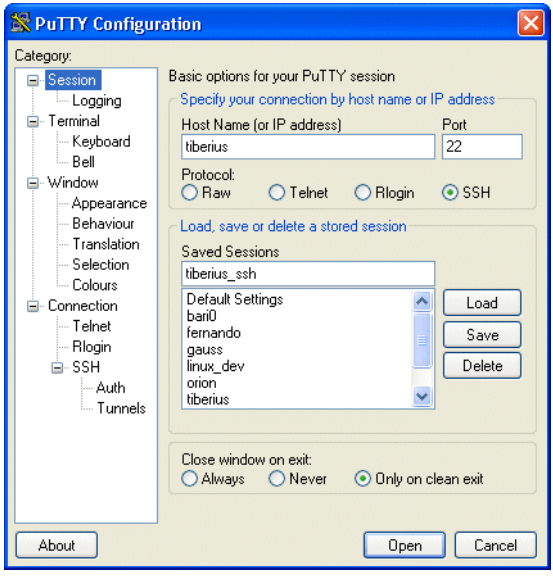


Figure 56: PuTTY Configuration: Session

Under *Category Connection*, set the user ID and the terminal type to be used for the PuTTY terminal emulation.

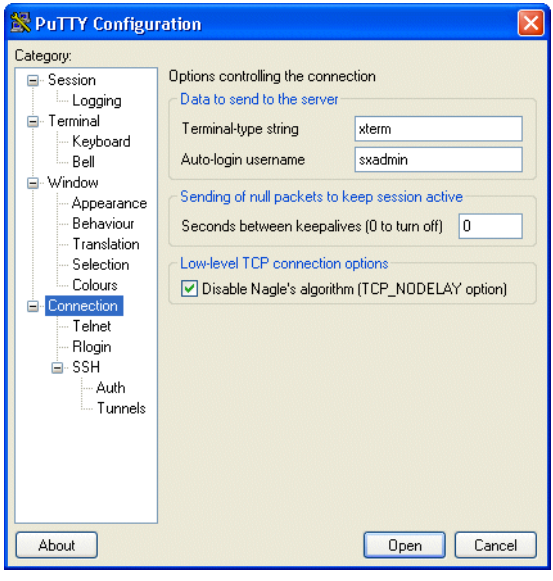


Figure 57: PuTTY Configuration: Connection

In *Category Connection* -> *SSH*, enter the command to start the CDE user interface. The command is: `/usr/dt/bin/Xsession`

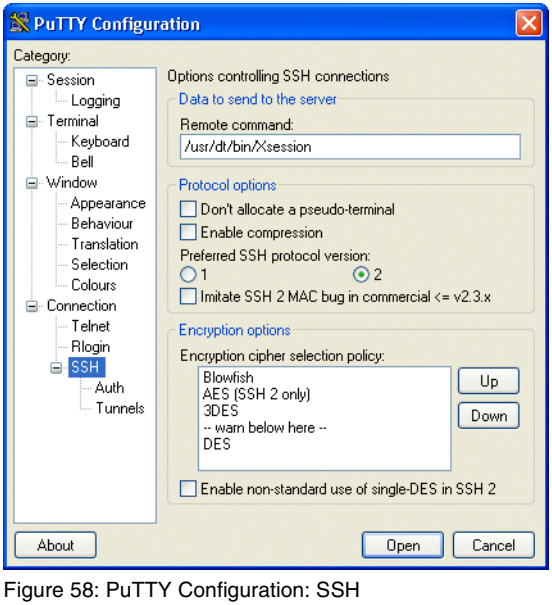


Figure 58: PuTTY Configuration: SSH

In *Category Connection* -> *SSH* -> *Tunnels*, configure the X tunnel and the local DISPLAY to be used.

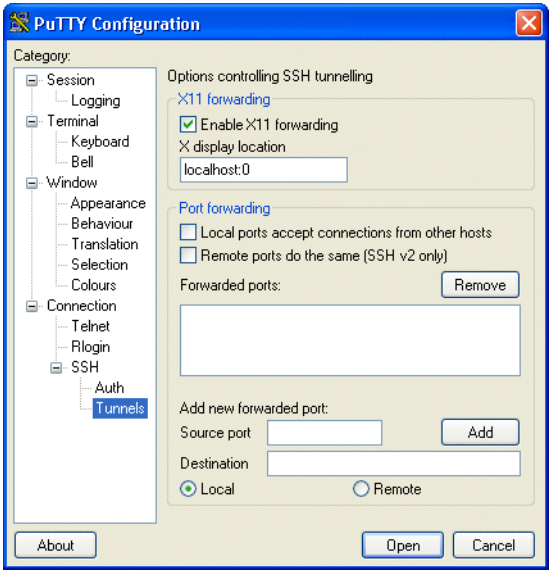


Figure 59: PuTTY Configuration: Tunnels

If logon to the server is to be key-protected rather than password-protected, you should set *Category Connection* -> *SSH* -> *Auth*. This will ensure that the key required is generated beforehand and that the public key is set on the server.

Once you have completed the connection settings, you can save them in *Category Session* with -> *Save*.

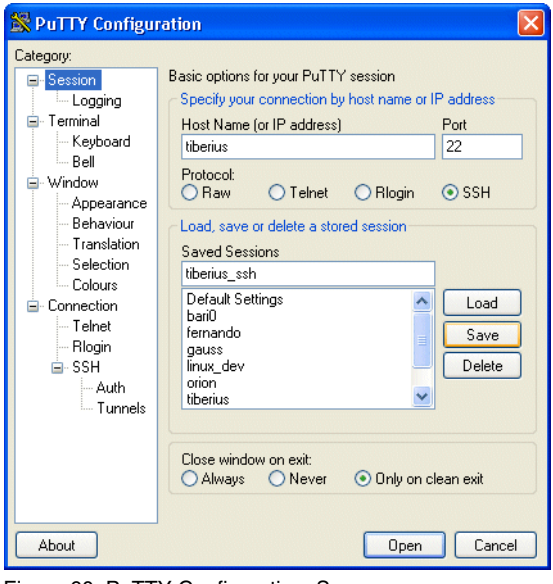


Figure 60: PuTTY Configuration: Save

6.3.3.2 Using Exceed via Secure Shell

1. Call Exceed to start the X server.
2. Call PuTTY and start the pre-configured connection to the server (double-click on the entry for the connection required).
3. Depending on the PuTTY and SSH configurations the procedure will continue in one of the following ways:
   a) PuTTY opens a terminal emulation and requests the entry of a user ID (this will not occur if a user ID was previously configured in the *Category Connection*).
   b) PuTTY opens a terminal emulation and requests the entry of a password (this will not occur if an authentication key is being used and the key has been accepted by sshd).
   c) PuTTY opens the terminal emulation and requests the entry of a pass phrase (this will not occur if no key is being used or if the key used is not protected by a pass phrase).
4. PuTTY starts the user interface on the server displaying the local X server.

The user interface is similar to the one displayed during operation without Secure Shell (see chapter “Functions of the Solaris-CDE interface” on page 27).

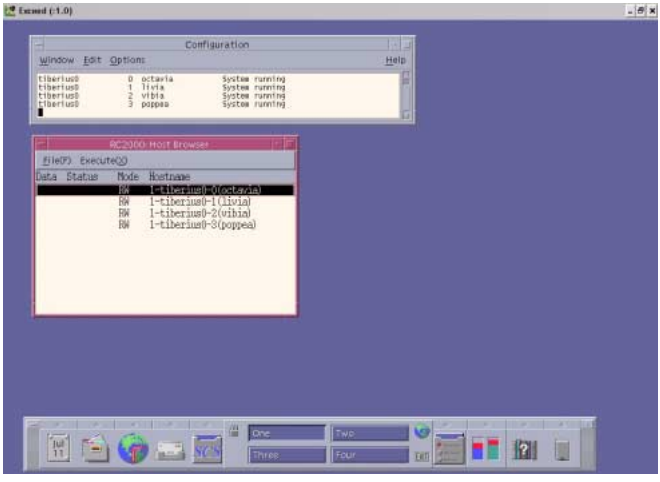


Figure 61: Example of user interface started from PuTTY

6.4 Key management for Secure Shell

6.4.1 Generating the keys

In SSH authentication and encryption are based on the asymmetrical system of public and private keys. Encryption and decryption are performed with different keys, and it is not possible to derive the key for decryption from that for encryption. For this purpose the user generates a pair consisting of a public and a private key. The public key is intended for forwarding to other users, while the private key is not forwarded by the user.

The two keys are used as follows:

Authentication

- When a user is logged onto a remote system this system generates a random number, encrypts it with the user's public key, and returns it to the local system. The corresponding private key is required to decrypt this coded random number; the decrypted date is returned to the remote system and is checked there. This is the way in which the owner of this private key identifies himself/herself.
- The private key enables signatures (e.g. for a digital signature) to be generated. A signature generated with a private key cannot be forged by anyone who does not own this key.

Anyone who has the associated public key can verify that a signature is genuine.

Encryption

- The public key can also be used to encrypt a message to someone who owns the associated private key.
- Only someone who owns the associated private key can decrypt such a message.

As the public key is only used for encrypting a message, it is not so important to ensure that it gets into the wrong hands, in contrast to the private key.

Generating the keys

Variaous algorithms are available for generating such key pairs. The most familiar are RSA and DSA. In Solaris they can be generated by calling the `ssh-keygen` command (see http://www.openssh.com). The generation of RSA keys in SSH protocol version 2 is recommended. The minimum key length is 512 bits. 1024 bits are generally regarded as sufficient. The keys generated are saved in the local Solaris file system:

In SSH protocol version 1 the private key is stored by default in the directory `$HOME/.ssh/identity` and the public key in the directory `$HOME/.ssh/identity.pub` of the user.

In SSH protocol version 2 the RSA authentication identity is stored in the file `$HOME/.ssh/id_rsa` and the public RSA key in the file `$HOME/.ssh/id_rsa.pub`.

In SSH protocol version 2 the DSA authentication identity is stored in the file `$HOME/.ssh/id_dsa` and the public DSA key in the file `$HOME/.ssh/id_dsa.pub`.

The key pairs can also be generated using a tool supported by the GUI. The PuTTY key generator is described in the section “PuTTY with PuTTYgen and Pageant” on page 157.

Distribution of the public keys to the communications partners

In the next configuration step the user must distribute the public key in the `$HOME/.ssh/authorized_keys` file to all remote systems with which he/she wishes to communicate. You can do this, for example, by copying the local identity file for the public key to the remote systems and appending its content to the `$HOME/.ssh/authorized_keys` file.

Pass phrases

The private key must not get into the wrong hands. Several protection mechanisms are provided in the SSH for this purpose. The ssh program issues a warning if the local identity file is readable for anyone except the owner. A pass phrase can be agreed on when a key pair is generated. This pass phrase is used for encrypting and decrypting the private key when writing to or reading from the identity file.

You are recommended to protect the private key with a pass phrase.

A pass phrase is an extension of the password. It can be a sequence of words, numbers, blanks, symbols or other characters. Good pass phrases are 10 to 30 characters long and contain a sequence of upper- and lower-case characters, digits and non-alphanumeric characters which are not easy to guess.

Unlike a password, a pass phrase is not transferred to the remote computer in the context of an authentication procedure.

There is no way you can recover a lost pass phrase. If you have lost one, a new key pair must be generated and its public key must be distributed to the communications partners.

6.4.2 Use of SSH agents

Use of an SSH agent means that it is not necessary to type in the pass phrase (which is normally long and complex) each time you call the `ssh` program.

In an initialization run for SSH the key pairs are generated, stored in the local files, and the public keys are distributed to the communication partners. At the start of an interactive session or of a script the SSH agent is started by calling the `ssh-agent` command (see http://www.openssh.com). The necessary private keys are then transferred to it using `ssh-add`. The SSH agent keeps these private keys in memory in encrypted form. It requires the pass phrases for the decryption process if any have been specified.

From now on until its shutdown the SSH clients contact the SSH agent automatically for all key-related operations. If a remote connection is to be set up using an `ssh` call, the local SSH agent and the remote `sshd` daemon automatically perform the required authentication procedure.

If a pass phrase is used it need only be entered once. It is read by `ssh-add` from the current terminal if `ssh-add` was started from the terminal. If `ssh-add` has no terminal assigned but the variables `DISPLAY` and `SSH_ASKPASS` are set, the program specified by `SSH_ASKPASS` is executed and an X11 window is opened to read the pass phrase. This is useful if `ssh-add` is called in an .Xsession or in a startup script.

Example

```
ssh-keygen -b 1024 -t rsa -C <comment> -N "<pass-phrase>" # Generates a
1024-bit RSA key in SSH Version 2 protected by a pass phrase
ssh-agent /bin/csh # As an argument the path can be specified to a shell
or shell script
ssh-add # By default loads all keys of the Identity file
```

The environment variables which point to the socket of the SSH agent must be set so that the SSH client can communicate with the agent. The `ssh-agent` program supplies the information required for this purpose when it returns:

Example

```
# In SSH Version 1, OpenSSH and Sun_SSH Notation:
SSH_AUTH_SOCK=/tmp/ssh-JGK12327/agent.12327; export SSH_AUTH_SOCK;
SSH_AGENT_PID=12328; export SSH_AGENT_PID;
# In SSH Version 2 Notation:
SSH2_AUTH_SOCK=/tmp/ssh-JGK12327/agent.12327; export SSH2_AUTH_SOCK;
SSH2_AGENT_PID=12328; export SSH2_AGENT_PID;
```

These output commands of the `ssh-agent` program can be executed using the `eval` command. When doing so please take into account the reverse quotes (`):

```
eval `ssh-agent ...`
```

The `eval` command instructs the shell to let the `ssh-agent` command run and to execute the commands generated by it. Afterward the shell variables `SSH_AUTH_SOCK` and `SSH_AGENT_PID` are available. After the `eval `ssh-agent`` command has been executed the PID of the SSH agent is output.

The `eval `ssh-agent`` command should be included in the `~/.bash_profile` file.

Shell scripts

If SSH Shell Scripts are to be used, the installation of the SSH agent, the setting of the correct environment, and the supplying of the agent with the required keys and pass phrases can be carried out in an initialization phase or in a startup script before the script with the `ssh` calls is started.

In addition the SSH script must be instrumentalized to set these variables in the environment variables. To do this the output of the `ssh-agent` program must have been saved in an auxiliary file which is then executed in the script using the “dot” command.

Example

```
ssh-agent|head -2 > <auxfile> #Store environment in initialization phase
:
:
:
. <auxfile> # Set environment in script
```

6.4.3 PuTTY with PuTTYgen and Pageant

This section describes the generation of key pairs and the distribution of the public keys using PuTTY[1]. PuTTY is a free implementation of Telnet and Secure Shell for Win32 and Unix System-based platforms and is useful in dialog mode.

Key generator PuTTYgen

The key generator PuTTYgen[2] generates pairs of private and public keys which can be used with PuTTY, PSCP, and Plink, and also with PuTTY's authentication agent Pageant.

The general procedure for generating a new key pair using PuTTYgen is as follows:

- First you must define the type of key (RSA for SSH Version 1 or 2, or DSA for SSH Version 2) and its length.
- Then you must click on the *Generate* button to generate the key.
- The *Key fingerprint* box shows the fingerprint value, a brief description of the generated key.
- A pass phrase can be selected using the *Key passphrase* and *Confirm passphrase* boxes. If these fields ar left empty the private key is stored in the file unencrypted. This should not be done without good reason.
- To save the private key to disk click on the *Save private key* button and PuTTYgen will open a dialog box which is used to query where the information is stored. Select a directory and a file name and click on *Save*. The file will be stored in the format used by PuTTY (file extension .ppk).
- The public key need not be stored locally on disk; it can also be copied directly onto PuTTY sessions which run on the remote server. For this purpose the you create a connection to these servers using PuTTY. Afterward you must switch to the directory $HOME/.ssh and open the `authorized_keys` file with an editor (if no public key exists there, the file must be generated). Then switch to the PuTTYgen window, select the entire text in the box *Public key for pasting into authorized_keys file*, and copy it to the clipboard. Go back to the PuTTY window and enter the data in the opened file. You must ensure that all data is contained in one line. Save the file.

1. See http://www.chiark.greenend.org.uk/~sgtatham/putty
2. See http://the.earth.li/~sgtatham/putty/latest/htmldoc/Chapter8.html

Authentication agent Pageant

PuTTY's authentication agent Pageant[1] contains the encrypted private keys in the memory and, as required, generates signatures or deals with the authentication procedure. At the beginning of a Windows session you start Pageant. If you then click on the Pageant icon with the right mouse button a menu opens. By selecting *View Keys* you open the main window of Pageant which contains a list box with all the private keys currently offered by Pageant.

To add a key to Pageant click on the *Add Key* button. Pageant then opens the *Select Private Key File* dialog box. In this dialog box select the file that belongs to your private key and click on *Open*.

Pageant then loads the private key into the memory. If the key is protected by a pass phrase Pageant requests this. As soon as the key is loaded it appears in the list box of the Pageant main window.

You can now start PuTTY and open an SSH connection to a system which accepts your key. PuTTY recognizes that Pageant is running, fetches the key automatically from Pageant, and uses it for authentication. You can now open further PuTTY connections without having to type in the pass phrase each time.

1. see http://the.earth.li/~sgtatham/putty/latest/htmldoc/Chapter9.html

7 Operating BS2000 instances

7.1 Starting BS2000

To start BS2000, you will first need a BS2000 console screen (see the following section “Accessing BS2000 console mode”). When the status bar appears in the first line, use the F2 key to branch into the Main KVP Function Menu (see page 164). Select *SVP commands* (see page 169). Now you can select *IPL - start BS2000* . Here, on the first call after installation, you must specify the IPL parameters (IPL device, IPL console and, if channel devices are available, the IORSF level) and send the menu. The system automatically switches back to the BS2 console screen. You can monitor the runtime messages of the IPL on this.

The system remembers the last IPL data and displays it at the next IPL. Normally, therefore, you do not have to make any entries in the IPL screen on subsequent starts.

You can automatically boot BS2000 after starting Solaris if you configure the “Automatic IPL” (see page 215). If the BS2000 startup procedure issues a query even though a start up type “A” has been set, the procedure will stop at this query prompt and await a response.

7.2 BS2000 console mode

The BS2000/OSD operating system is operated in BS2000 console mode. The necessary commands are described in the “Commands, Volumes 1 - 5” manuals [11].
If these are BCAM commands they are contained in the manual “*open*Net Server (BS2000/OSD) – BCAM” [17]. In addition to commands, responses to BS2000 system messages are required. All BS2000/OSD-BC system messages are described in the “System Messages” [13] manuals.

7.2.1 Accessing BS2000 console mode

For the console inputs/outputs you require a KVP. You will find an overview of its configuration in the section “Functions” on page 210. However, the KVP is only responsible for controlling the I/O traffic between X2000 and BS2000. You require the BS2000 console mode described here to display the inputs/outputs.

dtterm terminal windows of the SMC or 97801 terminal windows (SINIX-TE or SKP-SR, but not possible when the Secure Shell is used) can be used for the BS2000 console mode.

KVP IDs are assigned to the BS2000 console mnemonics. A Solaris login of the same name exists for every KVP ID:

Example

Solaris login:	`cons0`
KVP ID:	`CONS0`

It is therefore necessary to log in under one of the Solaris logins `cons0..7` to access console mode. If further KVP IDs are set up for BS2000 operation in addition to `CONS0..7`, you can also use Solaris logins with the same names as these.

A KVP process which is always running in the background ensures that one console (with CONS0) is always logged on at the BS2000 system.

- Opening a BS2000 console window under the CDE interface of the console/SMC

  To open a BS2000 console under the CDE interface of the console/SMC, icons have already been created for the pre-defined logins *sxadmin* and *bs2admin*. This enables the BS2000 console to be called easily and securely either locally at the hardware console or when operated remotely via a PC or X server.

Click on the relevant icon on the front panel of the CDE interface to automatically open a window in which the functionality of the BS2000 console will be available after authorization (log in with the X2000 login `cons0..7`) (see also section “Calling terminal instances” on page 40).

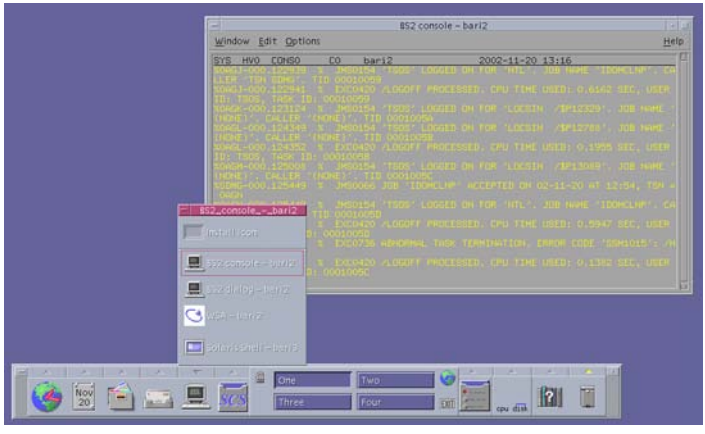


Figure 62: Opening a BS2000 console window under the CDE interface of the SMC

- BS2000 console window using the optional SKP-SR (only SX130)

  An SKP-SR outputs the windows preconfigured there locally on its console or remotely on a PC with an X server (not possible when the Secure Shell is used). The functionality of the BS2000 console is available after authorization has been granted (log in with the X2000 login cons0..7).

- BS2000 console window using SINIX-TE on an administration PC

  If SINIX-TE is used on the administration PC to display 97801 windows, a corresponding session must be set up to the X2000 of a BS2000 partition by specifying the login `cons0..7` (not possible when the Secure Shell is used). In addition to the X2000 connection name and host address, the connection type RLOGIN and the login `cons0..7` must be specified as the connection parameters (see also section “Configuration and operation” on page 135).

Working with terminal type dtterm

As the BS2000 messages are output from the KVP program in yellow and the dtterm window by default has a light background, ensure that the dtterm window is opened with a dark background (e.g. grey65). This is taken into account with the pre-installed console windows in the *sxadmin* and *bs2admin* logins.

Examples of possible background colors

grey65...70, DarkGrey, tan2, burlywood3, DarkKhaki, CadetBlue, PeachPuff3, NavajoWhite3, SteelBlue2

Working with terminal type bs2console

If you intend working with a light background you must use a different color scheme.

Emergency messages/queries:	red
Messages/inputs:	normal
KVP messages:	normal underlined

You are recommended to activate this color scheme via terminal type *bs2console*.

This type is a special dtterm and can be activated by:

– Call for preconfigured button on console/SMC:

```
/usr/dt/bin/dtterm -fn 9x15 -title "BS2000 console" –tn bs2console -e
rlogin <Name of system> –l cons0
```

When the Secure Shell is used the call is:

```
/usr/dt/bin/dtterm –fn 9x15 –title "BS2000 console"  –tn bs2console –e ssh
<name of the system> –l cons0
```

– Call directly on a dtterm screen of an SX server entry-level model:

```
TERM=bs2console /opt/SMAW/X2000/bin/kvpbs2 HV0 CONS0
```

Additional data for the terminal types dtterm and bs2console

– Other character sets are also possible:

e.g. `–fn 9x15`

– A larger screen is possible:

e.g. `–geometry 100x30` (100 columns, 30 lines)

WARNING!
There must be at least 80 columns, otherwise the `BS2000 console screen` will immediately be closed.

– The geometry can be changed during current operation by dragging with the mouse. The following rule also applies here: as soon as you drop below 80 columns, the BS2000 console screen will be terminated.

Protecting access to BS2000 console mode

Access to BS2000 console mode is protected as follows:

If you log on dynamically, the Solaris welcome screen automatically asks you to enter a valid password.

– If the Solaris login has been locked, access to the console is canceled. The login must then first be released using the Solaris user administration (see section “User and group administration” on page 330 and “BS2 Users” on page 211).

– If the Solaris login was locked during operation, processing is stopped in the event of *Permit Input* or *Inhibit Input* (see page 164). The login must then be released using the Solaris user administration (see section “User and group administration” on page 330 and “BS2 Users” on page 211).

When you have successfully logged on in BS2000 console mode, you can change your password at any time via the Main KVP Function Menu (see page 164), or the system administrator can change it via the Solaris user administration (see section “User and group administration” on page 330 and “BS2 Users” on page 211).

If you leave the workstation for a short time, you can lock entry via the Main KVP Function Menu (see page 164). You can unlock entry in the same way later. Outputs are not affected by this locking.

Assigning a KVP ID console mnemonic

Every BS2000 console is known to BS2000/OSD by its mnemonic console name. Every KVP user ID which is configured for BS2000 operation is assigned a BS2000 mnemonic console name. A mnemonic console name can also be assigned several times.

If several KVP IDs with the same mnemonic console name are active, a BS2000 console is displayed on several operator terminals at the same time. Outputs which are directed to a BS2000 console with a specific mnemonic console name are forwarded to all active KVP user IDs with this mnemonic console name. Inputs, however, are handled on the relevant station and not displayed on any other operator terminals.

Assigning a KVP ID IPL mnemonic console name

X2000 ensures that a BS2000 console always exists, even when no-one has opened a BS2000 console screen. The relevant background process always runs under the KVP ID CONS0. The mnemonic console name belonging to CONS0 is then always registered with the BS2000 system as an IPL console. The background process does not respond to any queries.

If anyone logs on later under CONS0, the most recent messages are displayed for them on the screen so that they can determine whether they may have to respond to a query.

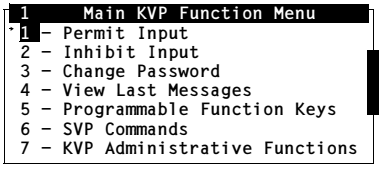
All other KVP processes also have a BS2000 console background process of this type (e.g. CONS0VM2). This enables the guest systems also to be booted without a console screen.

Number of operator terminals

Depending on the hardware and software configuration, a KVP can support up to sixty BS2000/SVP operator terminals.

7.2.2 The Main KVP Function Menu

The key F2 opens a menu displaying operating functions. The current console window is displayed in the background. New BS2000 outputs can only be seen when the BS2000 console screen is active. BS2000 console outputs and logging continue to be handled without restrictions.


1 Main KVP Function Menu
1 - Permit Input
2 - Inhibit Input
3 - Change Password
4 - View Last Messages
5 - Programmable Function Keys
6 - SVP Commands
7 - KVP Administrative Functions

To execute the actions at the bottom of the screen, press the keys F1 - F8.

The key F8 closes the menu.

Use the functions ↓ and ↑ to select one of the following functions. When you have selected the function, start the function with ENTER:

1 – Permit Input

You can permit input again. The valid password will be requested. If you supply an incorrect password, the system will wait for approximately 6 seconds. This prevents an automated trial and error attack.

2 – Inhibit Input

You can lock your screen against unauthorized inputs. If someone attempts to make an input when it is locked, the message `INP. LOCKED` appears in the KVP status bar (i.e. in screen line 1). In addition, an error message (`KVP0071 ...`) appears.

3 – Change Password

You can change the password of the Solaris login which is assigned to the used KVP ID. You are asked to enter first the old password and then the new password (twice for security reasons).

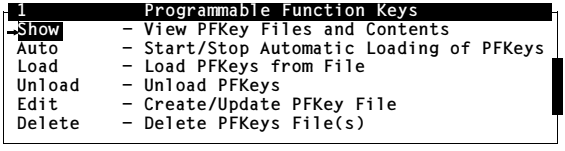
4 – View Last Messages

You can use this function to view the last 400 (approx.) messages. The last page is always shown first. The start of the data is indicated by “S T A R T” in the first line. You can page through the messages with the tool pg (see page 174).

To be able to see new incoming messages you must return to the BS2000 console screen.

5 – Programmable Function Keys

You can use this function to call up a menu to edit P keys or F keys:


1 Programmable Function Keys
→Show – View PFKey Files and Contents
Auto – Start/Stop Automatic Loading of PFKeys
Load – Load PFKeys from File
Unload – Unload PFKeys
Edit – Create/Update PFKey File
Delete – Delete PFKeys File(s)

A maximum of 14 programmable function keys (P keys or F keys) can be assigned (P7 - P20). Each P key or F key which is assigned can contain up to 1024 characters.

WARNING!
Only F7 - F10 are possible on the console/SMC.
A BS2000 console input must not exceed 256 characters.

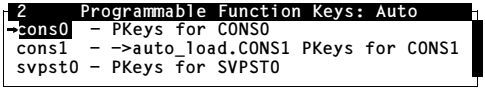
The keys P7 - P20 are all assigned in one reservation record and stored in exactly one PFKey file. The names of the PFKey files are determined by the user or system administrator. They are freely selectable, comprising up to 32 characters, including the suffix `.pfk`, but must observe the Solaris constraint concerning file names. All PFKey files are located in the directory `/etc/opt/SMAW/X2000/pfkeys`.

The assignment of PFKeys can be changed as often as desired by users during a session and in all their virtual screens. PFKey files are not subject to any separate management and can be used by all users. In particular, there are no restrictions relating to the user ID or console.

If no file is yet available, the actions which cannot yet be executed are grayed out (see the edit screenshot). If the access permissions only allow files to be read, a file of this kind can be displayed but not edited or deleted.

- **Show – View PKey Files and Contents**
  This function opens a selection window which displays the names of all P key files in the P key directory.
  When you select a P key file and press the key ENTER, the contents of the selected file are displayed in a new window.

- **AUTO – Start/Stop Automatic Loading of P keys**
  Selecting this function opens a selection window which displays the names of all P key files in the P key directory:

  When you select a PFKey file and press the key ENTER, an option window appears.

There are two options:

– the “start” option:

```
3   Programmable Function Keys: Options

Automatically Load PFKeys          start
```

The “start” option immediately loads and activates the selected PFKeys for this session. A restart automatically loads and activates them for all other consoles with the same user ID.

This function is only executed for consoles with the same user ID as the console which calls it. A note (-> auto_load.<id>) is output in the description line of the PFKey file.

The user can unload the automatic PFKey assignment during a session at any time or load another PFKey file.

– the “stop” option:

```
3   Programmable Function Keys: Options

Automatically Load PFKeys          stop
```

The “stop” option stops the PFKeys from being automatically loaded. All PFKeys which have already been loaded remain valid. The note (-> auto_load) is removed. This function may be executed by any user console.

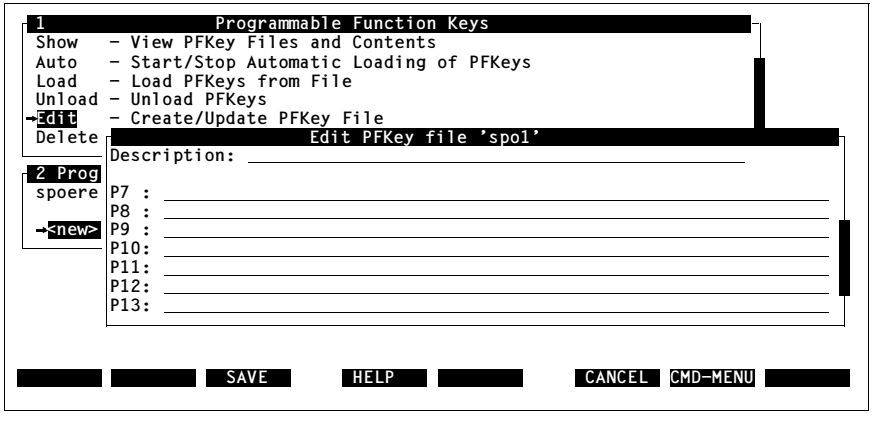
Select an option with the key [CHOICES] and then press the key [SAVE], to execute the operation.

- **Load – Load PFKeys from File**
  This function opens a selection window which displays the names of all PFKey files in the PFKey directory.
  When you have selected a PFKey file and pressed the key [SAVE], the assignment of the PFKeys is valid for the active session.

- **Unload – Unload PFKeys**
  This function deactivates the valid PFKey assignment, if available.

- **Edit – Create/Update PFKey File**
  This function opens a selection window which displays the names of all PFKey files in the PFKey directory. If necessary, you can scroll through the contents of the window. Select a PFKey file or the file “NEW” and press the key [ENTER]. This displays the contents of the file for modification/creation. Then press the SAVE key, to write the displayed contents back into the original file or to create a new file.
  The PFKey assignment remains unchanged (see “Load”).

A rudimentary FMLI editor is available. Another X2000 editor can also be used for longer or more complex processing.



Carriage return is the only control character which is supported. It is entered as a character string <cr> at the end of a command (note: 4 characters!) and then has the same effect as the data transfer key (Send Enter).

Example: /SHOW-PENDING-MSG<cr>

- **Delete – Delete PFKey File(s)**
  Selecting this function opens a selection window which displays the names of all PFKey files in the PFKey directory. If necessary, you can scroll through the contents of the window.
  Mark the PFKey files to be deleted with the key MARK. Then press ENTER to delete the marked files.

  Press MARK again to remove a mark.

6 – SVP Commands

Selecting this option opens a window in which you can call SVP commands:

```
1                    SVP Commands
→ipl     - start BS2000
dipl     - start BS2000 dump IPL
vipl     - start VM2000
vmmr     - VM monitor restart
iohdump  - dump IOH memory
iosdump  - dump IOS memory
chinit   - channel initialization
iorsf    - report iorsf files
param    - report actual default parameters for IPL
```

At the SVP commands `ipl`, `dipl` and `vipl` you can specify a system name for BS2000 in the questionnaires. It consists of at most 8 signs. Allowed signs are characters and numbers, whereby the first sign must be a character. If the BS2000 system is part of an MSCF cluster, its system name must be unique within this cluster.

- **ipl – Start BS2000**

  A form is opened to start BS2000:

```
2                  start BS2000

IPL load device:                    D1
consol device:                      Z0
IORSF level:                        5
IPL parameter [a|d|f]:              a
clear BS2000 memory [y|n]:          n
```

  When this form is called, the data of the last IPL is always entered. This can be changed as required.

  > If BS2000 has already been loaded, an additional line appears in the form:
  > `BS2000 is already running! – restart [y|n]` **n**
  > If a restart is to be performed, you must change **n** to **y**. Otherwise the IPL screen is quit without any action being performed.

  IPL load device: Device MN: 2 or 4-digit BS2000 mnemonic device name

  Console device: Console MN: MN from SKP write path (the MN is preset to “Z0” by the SKP write path in the preinstalled system)

  IORSF level: If channels are connected: Value 0 - 9; if no entry has been made (-), the last value used is taken.

  IPL parameter [a|d|f]:
  - a Automatic startup (Default)
  - d Dialog startup
  - f Fast startup [1]

  BS2000 system name: System name for BS2000 (max. 8 characters)

[1] The OSF function START IPL always starts the system up with an automatic BS2000 startup.

Clear BS2000 memory [y|n]:

y Clear BS2000 memory
n Do not clear BS2000 memory

The form is sent by pressing SAVE.

When the IPL has been started, the console screen is automatically activated. Messages may be output which provide information on the state of the computer or on errors which may have occurred.

If the IPL was executed correctly, a message is output with the message code SVR0001 (see page 344): `IPL OK`.

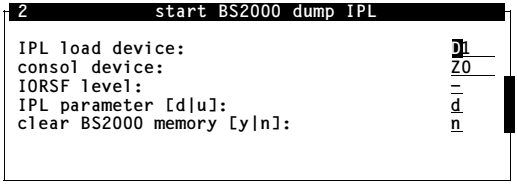
If the IPL was executed incorrectly, a message is output with message code SVR0002 (see page 344). Possible message texts:

Messages	Meaning
`No IPL possible for this device`	Load device is neither DISK nor TAPE.
`IPL device not installed`	Load device is not configured.
`Error with device status`	IPL CCW execution by load device terminated with error.
`Error with channel status`	IPL CCW execution by load device terminated with error.
`IO with CC=1`	Load device is active.
`IO with CC=3`	Load device or path not available.
`Invalid IPL data`	BS2000 boot block contains errored channel program.
`System Error`	BS2000 boot block contains incorrect data.
`Equipment check`	Load device error.
`intervention required`	Load device requires operator intervention.
`Wrong console device`	SKP write path is not configured.

Table 4: Message texts with message code SVR0002

dipl – start BS2000 dump IPL

A form is opened to start BS2000:



IPL parameter [dlu]: d SLED startup (default)
u UNLOCK [1]

For further information, see the command “ipl – Start BS2000” on page 169.

First, an IOH dump and an IOS dump are created:

– The IOH dump is stored in the directory `/var/opt/SMAW/X2000/dump` with the name `RMA_S.<IOH abend code>.<DateTime>.<X2000 version>`. If no IOH abend code is available, `SLD000` is used.

– The IOS dump is compressed and stored in the directory `/var/opt/SMAW/X2000/dump/channel` with the name `IOSDUMP.<DateTime>.Z`.

The SLED is then started. The IOH and IOS dumps are stored in the SLED.

- **vipl – start VM2000**

  A form is opened to start VM2000:

  This command starts VM2000.

  For further information, see the command “ipl – Start BS2000” on page 169.

- **vmmr – VM monitor restart**

  This command restarts the VM monitor system. A prompt is displayed to ensure that you do not forget to execute the command; enter `y` in the prompt to execute the command.

  This command only takes effect in the VM mode.

[1] The old context is overwritten with the current context (SLED by SLED).

iohdump – dump IOH memory

This command creates an IOHDUMP in the directory `/var/opt/SMAW/X2000/dump`.

Name of the file: RMA_R.<abend code>.<DateTime>.<X2000 version>

If no `abend code` is available, `SLD000` is used.

The number of IOHDUMPs is limited to ten. When the maximum number has been reached, the oldest file in the directory `/var/opt/SMAW/X2000/dump` is deleted.

- **iosdump – dump IOS memory**

  This command creates a compressed IOSDUMP in the directory `/var/opt/SMAW/X2000/dump/channel`.

  Name of the files:
  `IOSDUMP.<DateTime>.Z`

- **chinit – channel initialization**

  This command should be called if the channels do not function after an `IPL`.

  After the channel system has been initialized, an IPL is required.

  CAUTION!
  BS2000 operation must be stopped first. A BS2000 system run is canceled when this command is executed. If the BS2000 processor has not already been stopped, the following message appears:
  `BS2000 is already running - restart [y/n] n`
  In the message the `n` must be replaced by `y`, otherwise the channel initialization is not performed.

- **iorsf – report iorsf files**

  If channels are connected, you can output a list of the iorsf files with this command.

- **param – report actual default parameters for IPL**

  You can display the current IPL parameters on the screen with this command.

  Example

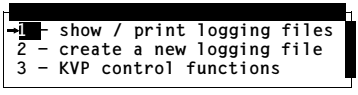
```
2 actual default parameters for IPL

IPL load-device: D6
consol-device:   Z0
IORSF-level:     -
```

  No IPL parameters are stored immediately after a first installation. An error message is output.

7 – KVP Administrative Functions

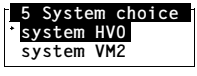
A window with the following functions appears:



► Select the required function. Then press ENTER (F3).

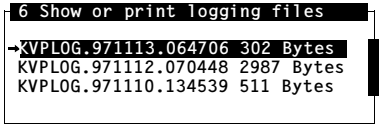
- **Show/print the logging files**

  The window “System choice” is opened:



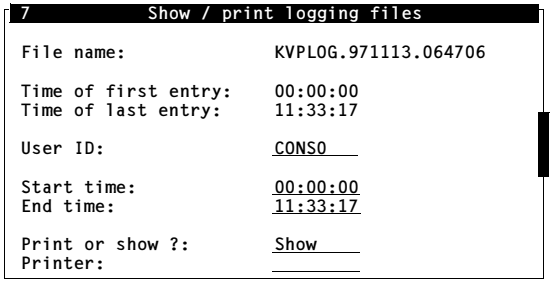
  ► Select a system.

  The menu “Show or print logging files” is opened:



  ► Select a logging file.

  The form “Show / print logging files” is opened:



  ► Fill out the form:

  The name of the logging file and the time of the first and last entries in the file are displayed (= time period of logging). You can filter the file by user ID and time in the other fields to print it or show it on screen.

  – **User ID**
    Only the logging files which match the specified ID are shown or printed.

– **Start time/end time**
By default, the times of the first and last entries of the logging file are shown. You can specify a shorter time period by entering other times within the specified time frame. The logging file is then filtered by this time period.

– **Print or show**
You can specify whether the logging file is to be shown or printed with CHOICES. If “Show” is set, press SAVE to display the logging file using the tool `pg` (see below).

It is possible that the logging file may be deleted while you are in the dialog box. If this occurs, you can return to the previous menu by pressing SAVE.

The following message will appear:

```
The logging file <name> no longer exists.
```

If this occurs repeatedly, this indicates that either too few logging files have been defined or that the size that has been selected is too small. In this case, select appropriate settings under “wsakvpbs2”. For instance, select 15 logging files for a size of 70 lines. The size must be increased accordingly for three logging files, otherwise the old file will constantly be overwritten when a new logging file is generated (see the point “Show or modify logging options (G)” on page 215).

It is also possible that not all logging entries which were added to the file in the meantime will be shown when the current logging file is selected. If this occurs, you must exit the window “Show/Print” and reselect the current status.

The tool `pg` makes various commands available with which you can control the output on the screen. The commands are described in the Solaris man pages (call with: `man pg`). The following is a list of only the most important commands:

↵	Show next page
1 ↵	Show first page
$	Show last page
+ n ↵	Page forward by n pages
- n ↵	Page backward by n pages
/ text ↵	Forward search for “text”
? text ↵	Backward search for “text”
h	Help information on all available commands

When “Print” is set, you are asked to select a printer from the field “Printer”.

– **Printer**
CHOICES opens a window in which you can select a printer.

If only a small number of printers are available, no new window is opened. In this case, the name of a printer is entered directly in the form. By repeatedly pressing CHOICES, you can select the required printer.

The logging file is then printed on this printer or placed in the queue for this printer.

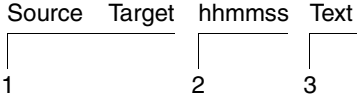
For more detailed information on printers and print jobs, see the manual "Xprint Management V6.0A GUI" [22].

The spool administrator should ensure that there is a printer available for `root` and all KVP users, to print out ASCII files.

The logging file is printed out with a width of 100 characters (unlike when it is shown or archived, when it has a width of 80 characters).

Format of the logging file

The entries in the logging file have the following format:



No.	Meaning
1	Source and target of message or command (Partner SYS or HAL / user CONS0, CONS1, ...)
2	Time
3	Message Text: If the message extends beyond one line, it is continued under the beginning of the message on the next line.

The first line has the following format:

```
LOG     KVPLOG.020620.165153 <- KVPLOG.020620.160000
```

`LOG` is specified as the source of the message for KVPLOG. The name of the current logging file comes after this. If an arrow with the name of an older logging file exists, this was the predecessor of the current file. No messages have then been lost.

If logging was not possible at a particular point, causing messages to be lost, no predecessor file will be specified here. When the Solaris system and consequently the KVP is restarted, no predecessor file will yet exist.

- **Create a new logging file**
  This function creates a new logging file. The old file is then closed.

- **KVP control functions**
  The window “System choice” is opened:

```
 3 System choice
*system HV0
 system VM2
```

► Select a system.

The window “KVP configuration and control function” is opened:

```
 5 KVP configuration and control function HV0
 Message   - Message to station
*Show-user - Show current users
 Show-log  - Show logging options
```

– **Message** – **Message to station**

You can send a message to another user ID with this function. If several users are logged on under this ID, they all receive the specified text.

When the function has been selected, the form “Message to station” is opened.

```
6                        Message to station

User ID:
_____
Message:
_____________________________________________________________
_____________________________________________________________
_____________________________________________________________
_____________________________________________________________
```

► Enter the user ID and the message. Then press ENTER to send the message.

– **Show-user** – **Show current users**

This displays all the KVP users of the selected system.

When you have selected the function, the information window “Show current user” appears:

```
6                                Show current user
    PID    User ID            Device Name  Console Mnemonic   SVP Device

 15699   CONSO                                CO
 21418   CONSO     /DEV/PTS/3                 CO
 17142   CONSO     /DEV/PTS/7                 CO

Command processed
```

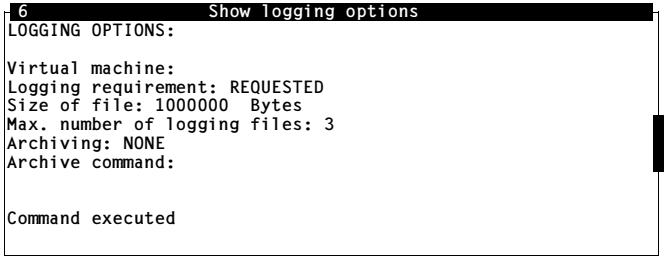
The process without a device name is the background process.

► Press CANCEL to exit the window.

– **Show-log – Show logging options**

You can display the currently valid logging options and the archiving command with this function.

When you have selected the function, the information window “Show logging options” appears:



The following settings are possible:

- REQUESTED
  Logging is carried out for as long as is possible. If an error occurs during logging, a message is output. Logging is suspended until the error has been eliminated. BS2000 can still be operated. Archiving can be set to “NONE” or “REQUESTED”.
- FORCED
  CAUTION!
  Logging is always carried out. If an error occurs during logging, a message is output. Logging is suspended until the error has been eliminated. BS2000 can no longer be operated. Outputs from and inputs to BS2000 are not forwarded. Archiving must also be set to “REQUESTED”.
- NONE
  Logging is not carried out. Archiving must also be set to “NONE”.

► Press CANCEL to exit the window.

7.2.3 Structure of the KVP screen

The screen is divided as follows in the BS2000 console mode:

Line	1	KVP status line
Lines	2-24	Dialog area (for dtterm: 2 - n)
Line	25	Status line of the operator terminal (for dtterm, this bar is omitted)

```
SYS  HVO  CONS0     C0    daphneADM           2005-03-15 11:53
+XAAD-000.114740     SYSTEM:       HOST-NAME          = *NONE
+XAAD-000.114740  SYSTEM-TIME-     ZONE               = +01:00
+XAAD-000.114740     PARAMETER:    SEASON             = W
+XAAD-000.114740                   SEASON-DIFFERENCE = 01:00
+XAAD-000.114740                   PREV-CHANGE-DATE  = 2004-10-31,03:00:00
+XAAD-000.114740                   NEXT-CHANGE-DATE  = 2005-03-27,02:00:00
+XAAD-000.114740                   SYNCHRONISATION   = SERVER-CONN-EXT-REF
! UCO-000.114740  %  NBR0740 COMMAND COMPLETED 'SHOW-SYSTEM-INFORMATION'; (RESUL
T: SC2=000, SC1=000, MC=CMD0001); DATE: 2005-03-15
/sh-disk-sta
+XAAD MNEM VSN     USE    DEV-A    VOL-A    PHASE    ACTION
+XAAD DO   DEL0.0          FREE     FREE    ONLINE  NO ACTION
+XAAD 1000 DAP0.0  DMS    PUBLIC  PAGING   IN-USE  NO ACTION
+XAAD 1001 DAPI.0          FREE     FREE    ONLINE  NO ACTION
+XAAD 1002 DAPD.0  DMS    PAGING  PAGING   IN-USE  NO ACTION
+XAAD 1003 DAPP.0          FREE     FREE    ONLINE  NO ACTION
! UCO-000.114925  %  NBR0740 COMMAND COMPLETED 'SH-DISK-STA'; (RESULT: SC2=000,
SC1=000, MC=CMD0001); DATE: 2005-03-15
%OBUZ-000.115010  %  JMS0154 'TSOS' LOGGED ON FOR '##000016/STATI026'. JOB NAME
'XAFU'. CALLER '(NONE)'. TID 00010075
```

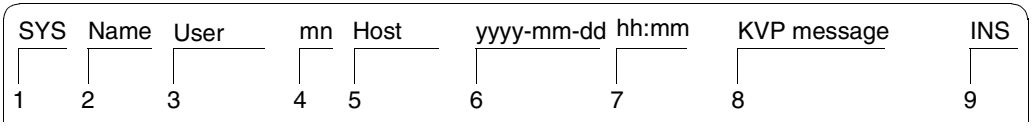
Figure 63: Screen areas for the CONS0 partner

If you call the KVP on a dtterm screen, the screen can be maximized or minimized.

If the number of columns falls below 80, the BS2000 console screen immediately closes.

KVP status line

In line 1, the KVP outputs status information. The status line has the following structure:



No.	Meaning
1	Partner SYS (BS2000/OSD) All inputs are sent to the system which is currently running.
2	KVP name
3	User ID
4	Mnemonic console name of the operator terminal as seen by BS2000/OSD
5	Name of the computer
6	Date in year-month-day format
7	Time in hour:minute format The time-of-day display is only updated on input or output.
8	KVP message
9	Indicates whether insert mode is activated (by INSCHAR)

Dialog area

Lines 2 through 24 form the dialog area for the inputs and outputs. By default; line 24 is reserved for the inputs. If necessary, a maximum of three further lines is made available. The roll-up outputs start above the input area.

Status line of the operator terminal

Line 25 is not used by the KVP. It is used by the terminal firmware to display the operating status of the terminal.

7.2.4 Inputs

KVP supports 97801 and dtterm terminals.

A BS2000 operator terminal normally operates in output mode. Press a character key to switch to input mode. The cursor is positioned in the input line (line 24 on the screen). If the input line is not large enough, additional input lines are made available. The maximum input length is 256 characters.

If an input was commenced but after 16 seconds nothing further was input, the warning `INPUT???` is output in the KVP status bar and a warning signal sounds. After a further 10 seconds, input mode is canceled with the message `INP.IGN!` and the input area is deleted.

All inputs sent to BS2000/OSD and all inputs canceled due to a timeout are placed in a buffer. A maximum of ten inputs are stored in this way. They can be displayed, edited and sent to BS2000/OSD again as needed. The following keys can be used to edit inputs:

F1	HELP (for dtterm)
F2	Go to KVP menu screen
F3	Scroll back in last inputs
F4	Scroll forward in last inputs
F5	Reserved
F6	Reserved
F7 - F20	Programmable function keys
⇥	Jump to character after next blank
↑	Move cursor up
↓	Move cursor down
→	Move cursor to right
←	Move cursor to left
↵	Send entire input
INSCHAR	Activate input mode
⌫	Delete character just before the cursor, close up text
DEL	Exit input mode

The key F2 is also effective in the EVENT screen.

If the input is locked, the message `KVP0071` and, in the KVP status line (line 1 on screen) the message `INP. LOCKED` are output. You must then first permit input (Key F2 -> *Permit input*).

When a command is input, the / prompt character of the BS2000 operating system must also be specified in front of the BS2000 command.

Messages must be responded to in different ways depending on the type of message.

7.2.5 Outputs

Outputs are made in the roll-up area (lines 2 through 23 on the screen, for dtterm 2 through n) in the order in which they arrive. You can switch to input mode at any time. Any outputs will then be blocked and output later.

If necessary, the output can be stopped on screen with the key combination CTRL S and then continued with CTRL Q. You should, however, only use these key combinations for a short time, as in extreme cases other operator terminals with the same mnemonic console names will be blocked.

7.2.6 Logging inputs and outputs

Depending on the log level which has been set, all inputs and outputs at operator terminals are written to a logging file. The logging file can be read and printed out (see the section "Show/print the logging files" as of page 173). The logging file can also be backed up automatically (see the function "Show or modify logging options (G)" on page 215).

Outputs in the KVP status lines are not logged.

7.2.7 Exiting BS2000 console mode

- Enter **::c** ↵ or press the keys END and CTRL d.

7.3 EM9750 mode

EM9750 mode makes the local BS2000 system available to you. You can also connect to a BS2000 partner computer. In this case, the communication software of your computer must be configured and loaded.
You can work with the BS2000 software which is available (utilities, application programs) in this operating mode.

Log in under `em9750`.

- Opening a BS2000 dialog window in the CDE interface of the SMC

  To open a BS2000 dialog window under the CDE interface of the SMC, icons have already been created for the pre-defined logins *sxadmin* and *bs2admin*. This enables the BS2000 dialog to be called easily and securely either locally at the hardware console or when operated remotely using a PC or an X server.

  Click on the relevant icon on the front panel of the CDE interface to automatically open a window in which the functionality of the BS2000 dialog will be available after authorization has been granted (log in with the X2000 login `em9750`) (see also section “Calling terminal instances” on page 40).

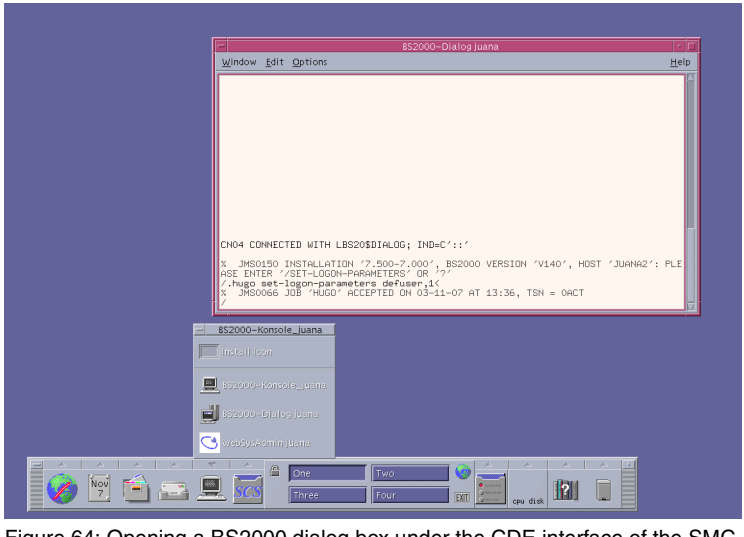


Figure 64: Opening a BS2000 dialog box under the CDE interface of the SMC

- BS2000 dialog window using the optional SKP-SR (not possible when the Secure Shell is used)

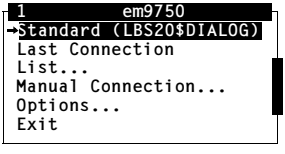
  An SKP-SR outputs the windows preconfigured there locally on its console or remotely on a PC with an X server. The functionality of the BS2000 dialog is available after authorization has been granted (log in with the X2000 login em9750).

- BS2000 dialog window using SINIX-TE on an administration PC (not possible when the Secure Shell is used)

  If SINIX-TE is used on the administration PC to display 97801 windows (especially to support Fujitsu Siemens emulation keyboards for BS2000), a corresponding session must be set up to the X2000 of a BS2000 partition by specifying the login `em9750`. In addition to the connection name and the host address of X2000, the connection type RLOGIN and the login `em9750` must be specified as connection parameters.

7.3.1 Establishing a connection with the EM9750 emulation

In contrast to the 9750 terminal, establishment of a connection is not initiated via the network access language but via menu-driven inputs to the emulation:



The following functions can be selected:

- **Standard**

  This establishes a connection to the standard partner. The standard partner (generally LBS20$DIALOG) is shown on the screen in brackets. The standard partner can be redefined (see the section “Configuring the 9750 emulation” in the manual “EMDS (SINIX)” [23]).

  The BS2000 LAN device (see section “Functions” on page 210) with the lowest device address (HC/Unit) establishes the standard partner for connection setup via the identification em9750 and for emergency error messages from X2000 to BS2000 (see section “X2000 messages to the BS2000 console” on page 381). The ID em9750 does not provide for a change of standard partner. If the system administrator still wants to change this he must do so via the file `/etc/opt/SMAW/X2000/standard_partner` with an editor. The emergency error messages are then also displayed on the relevant BS2000 console screen.

- **Last Connection**

  This function re-establishes a connection to the last selected partner. The partner is shown on the screen in brackets.

  After exiting EM9750, the last connection is no longer available.

- **List**
  This function outputs a numbered list of pre-defined connections. The required connection is selected by positioning the cursor and pressing the key CONNECT (F3). If more pre-defined connections are available than are displayed, a further list is output by pressing the key n.
  The description of how connections can be pre-defined for a user is given in manual "EMDS (SINIX)" [23].

  After initializing the establishment of a connection, the following process is performed:

  – If another connection password has to be entered, a corresponding prompt appears on screen.

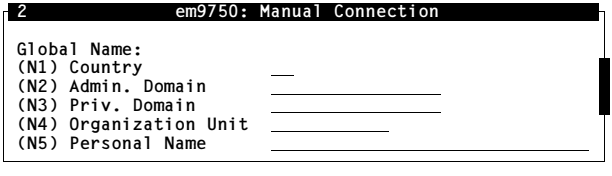
  – After entering the password, or if no password needs to be entered, the connection is established. The following message appears on the screen:
  `Waiting for connection... .`

  – When the connection has been established, the BS2000 screen appears with the message `CN04 CONNECTED TO partner` or the welcome screen of an application appears, depending on the connection partner.

  – If the connection cannot be established, you will receive an error message. The line `Reason num...` then contains information on why the connection was not established. The error messages are listed in the manual "EMDS (SINIX)" [23].

- **Manual Connection...**

  This enables connections to be established manually to any partner, i.e. data for establishing the connection (partner name, connection password, user message) must be entered. The following form appears when this function is selected:



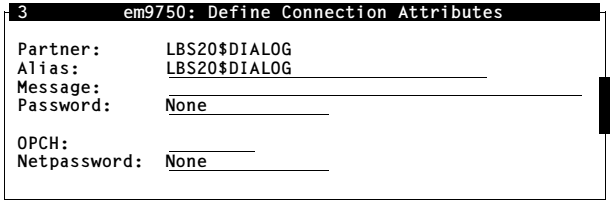
  You can make the following entries in the individual fields:

Country	Max. 2 characters long
Admin.Dom.	Administrative Domain, max. 16 characters long
Priv.Dom.	Private Domain, max. 16 characters long
Organization Unit	Organization Unit, max. 10 characters long
Personal Name	Max. 30 characters long

You only need to enter the partner in the field “(N5) Personal Name”. Complete the entry with <CR> and press the key CONNECT (F3).
The name of the partner must previously have been defined in TNSX (see the manual “CMX V5.1 (Solaris)” [24]).

► If the application requires further attributes to establish the connection, they can be passed by pressing ATTRIBUTE (F4):

This opens a window in which you can define the attributes:



– Message (max. 80 characters long)
A short message relating to the establishment of the connection can be entered here.

– Connection password
The key CHOICES (F2) defines whether a network password must be provided in order to establish a connection. The following options are possible:

None	The user is not asked to enter a password.
alphanumeric	An alphanumeric string must be provided as the network password (max. 4 characters long).
hexadecimal	A hexadecimal string must be provided as the network password (max. 8 characters long).

– OPCH max. 8 characters long
When an OPCH name is specified, the current terminal data is defined for the connection.

– Network password
No network password is needed for the establishment of a connection. No entry needs to be made in this field.

► Press SAVE (F3).

- **Options...**
A selection menu with the following items is output;
  – PFKey file
  – Hardcopy/Softcopy
  – Emulation status

Notes on operation when the emulation is running

- The complete range of functions of the EM9750 emulation is described in the manual "EMDS (SINIX)" [23].
- The terminal emulation used here is the same as the "Terminal emulation for the alpha-numeric workstation" described in that manual.

  Assignment of the function keys

  The assignment of the function keys is also described in the manual "EMDS (SINIX)" [23] and may differ according to the terminal emulation used.

  1. The following applies to the terminal type dtterm (operation on the SMC, the local console of an entry-level model or remotely on the administration PC with MFII keyboard):

	F1	**F2**	**F3**	**F4**	**F5**	**F6**	**F7**	**F8**	**F9**	**F10**	**F11**	**F12**
		NIL	LZF	LVD	K1	K2	K3	MAR	ED	**MENU**	EM	DÜ1
Shift	EFZ	AFZ	LZE	LSP	F1	F2	F3	RS	WAZ	SY	AM	DÜ2
Esc	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	LA1	HC
Esc Shift	P11	P12	P13	P14	P15	P16	P17	P18	P19	P20	P	SC

Table 5: Function keys for the terminal type dtterm

  – The EMDS function *MENU* changes the BS2000 screen to the FMLI interface.
  – The EMDS function *SC* generates a screen copy from the write mark onwards.
  – The EMDS function *HC* generates a copy of the entire screen via the printing program assigned to the function *LA1*.
  – The EMDS function *WAZ* restructures the BS2000 screen.

9750 function	**Key (sequence)**
AFG	Del
EFG	Ins
F4 ... F24	ESC f 4 ... ESC f 2 4
K4 ... K14	ESC k 4 ... ESC k 1 4
LA1... LA7	ESC l 1 ... ESC l 7
RU	End
SBA	Home
SDZ	PgUp
SML	←

9750 function	**Key (sequence)**
SMO	↑
SMR	→
SMU	↓
SNZ	PgDn
SZA	↵ oder ESC ← s. u.
TAL	⇤ oder ESC ⇥
TAR	⇥
VA	ESC v a

Table 6: MF-II special key assignments (9750)

EMDS function	Key (sequence)
EM1...EM9	ESC e 1 ... ESC e 9
HC	ESC h c
SC	ESC s c

Table 7: MF-II-special key assignments (EMDS)

– The EMDS functions *EM1* to *EM9* perform a change to the relevant terminal emulation.

– The EMDS function *HC* generates a copy of the entire screen via the printing program assigned to the function LA1.

– The EMDS function *SC* generates a screen copy from the write mark onwards.

2. The following applies to terminal type 98701 (Operation with SINIX-TE and Fujitsu-Siemens Emulation keyboard):

	F1	**F2**	**F3**	**F4**	**F5**	**F6**	**F7**	**F8**	**F9**	**F10**
	P1	P2	P3	P4	P5	P6	P7	P8	P9	**P10**
Shift	**P1**1	**P1**2	**P1**3	**P1**4	**P1**5	**P1**6	**P1**7	**P1**8	**P1**9	**P20**

	F11	**F12**	**F13**	**F14**	**F15**	**F16**	**F17**	**F18**	**F19**	**F20**	**F21**	**F22**
	K1	K2	K3	LZE	AM	LVD	MAR	RU	LSP	NIL	ED	DÜ1
Shift	F1	F2	F3									

Table 8: Function keys for terminal type 97801

You can obtain a keyboard template under the order no. U20076-J-Z148-1 (see also Siemens List of Publications). The current assignment of keys deviates from this template in one instance: The key F21 is not assigned the end marker, but EM DUE1. The end marker can be entered directly via the relevant key.

The function EM DUE1 is assigned to the Return key (in addition to the relevant function key).

- An existing connection to a partner can be closed down at any time. The emulation will then continue to be active:

  ► Press ESC V A
  or
  enter **::c** ↵

Configuring the 9750 emulation

Should additional administration of the terminal stations be necessary, the program *emadmin* can be used (call under `root`, see the manual “EMDS (SINIX)” [23]). You should note that the user name of the terminal is re-generated at each call.

7.3.2 BS2000 $DIALOG mode

If you wish to work in $DIALOG mode, you must establish a connection to the $DIALOG partner in the target computer. Select the relevant function from the menu to control the connection.
The $DIALOG partner of the local BS2000 system is normally preset as the standard partner. You can connect to the local BS2000 system via the name LBS20$DIALOG (LOCLAN).

The following screen format is output on the terminal (the precise screen format depends on the version of BS2000 used on the partner computer):

```
.....................................................................
.....................................................................
.....................................................................
.....................................................................
.....................................................................
.....................................................................
.....................................................................
.....................................................................
.....................................................................
.....................................................................
.....................................................................
.....................................................................
.....................................................................
.....................................................................
.....................................................................
.....................................................................
CN04 VERBUNDEN MIT LBS20$DIALOG.....................................
.....................................................................
.....................................................................
<...................................................................
% JMS0150 INSTALLATION '  ccc-x', BS2000 VERSION 'Vnnn', HOST 'PP80022': PLEASE
ENTER '/SET-LOGON-PARAMETERS' OR '?'.................................
/...................................................................
LTG                                                          TAST
```

Now you can enter the command SET-LOGON-PARAMETERS and then work in BS2000.

If the SET-LOGON-PARAMETERS command is rejected, the maximum number of dialog processes in BS2000 may have been exceeded. If this occurs, you can increase the limit as system administrator or try again later.

If the opening screen does not appear in $DIALOG mode, the system is not yet available (i.e. not loaded or not yet loaded completely).

- Check that the BCAM of BS2000 is ready (e.g. with the command /BCSHOW).

7.3.3 BS2000 transaction processing mode

If you wish to work in transaction processing mode, you must establish a connection to the required application in the target computer. To establish a connection (see page 183), select “Manual Connection” from the menu (see page 184):

- Enter the name of the application in the field “(N5) Personal Name” (partner name in the form `LBS2Oapplication`). <CR> completes the entry.

  Example

  ```
  2              em9750: Manual Connection

  Global Name:
  (N1) Country              __
  (N2) Admin. Domain        ________________
  (N3) Priv. Domain         ________________
  (N4) Organization Unit    ________
  (N5) Personal Name        LBS2OANW1_____________________
  ```

  Use the replacement character ^ to fill in any blanks in the name.

- Only when attributes are needed: Press [ATTRIBUTES] (F4).

  A window is opened in which you can define the connection attributes:

  ```
  3          em9750: Define Connection Attributes

  Partner:       LBS2OANW1
  Alias:         LBS2OANW1_____________________
  Message:       ______________________________
  Password:      None_________

  OPCH:          ________
  Netpassword:   None_________
  ```

  For a description of this form, see page 185.

- When you have completed the form, press [SAVE].

The terminal is now connected to the application. Generally, an opening screen appears.

If the menu for controlling the connection is output again instead of the opening screen of the application, the connection could not be established. The following errors may have caused this:

- Input errors (e.g. incorrect name of the application).
  Try again with the correct details.
- The partner system or line to the partner computer is currently not available.
  Try again later.
- The application is not loaded on the partner computer.
  Ask the system administrator of the partner computer to load the application.
- The name of the partner must previously have been defined in TNSX (see the manual “CMX V5.1 (Solaris)” [24]).

7.4 EVENT mode

General

Operating tasks can be carried out simply in EVENT mode. Special EVENT commands offer the option of calling up information and storing diagnostics information.

Messages output in EVENT mode are listed in the section “EVENT error messages” on page 382.

The Solaris system administrator can log on an EVENT screen dynamically from a Solaris shell with the command `/opt/SMAW/X2000/bin/event`. Otherwise, you can log on under the login `event`. Log out with END or CTRL d.

Entering commands

The commands in EVENT mode are entered in lowercase letters. You can correct input errors with the key ⌫. The following commands are possible:

Command	Page
ev.?	192
ev.info	192
ev.infoeks	192
sx.bs2mtcfetch	193
sx.chk_conf	193
sx.diag	336
sx.save_diag	337
F2	194

7.4.1 Possible EVENT commands

You can display the valid EVENT commands together with the available parameters on screen:

► `ev.?` ↵

7.4.2 Querying the version numbers of the installed X2000/Solaris software

You can output the version numbers of the installed X2000/Solaris software:

► `ev.info␣[<name>␣...][␣-p][␣-f]`↵

Meaning:

`name`	Name of a software package. If no name is specified, information on the installed software packages CMX and EMDS is output. Then the X2000 system version and information on the X2000 system are output.
`p`	Output is sent to a printer and not to the screen.
`f`	The information is output to a file: `/var/opt/SMAW/X2000/diag/event_info` The outputs are always appended to the file

If you need to contact the service staff, the version number of the installed X2000/Solaris software can be useful.

7.4.3 Information on patches

You can output information on all installed patches (single correction for Solaris):

► `ev.infoeks [-p][␣-f]` ↵

Meaning:

`p`	Output is sent to a printer and not to the screen.
`f`	The information is output to a file: `/var/opt/SMAW/X2000/diag/event_info` The outputs are always appended to the file

If you need to contact the service staff, the version number of the installed Solaris software and the version number of the patches can be useful.

7.4.4 MTC devices

Setting an occupancy option for MTC devices

You can specify that an MTC device is also to be occupied whenever the X2000 communication on BS2000 systems which can also use the device is disrupted:

▶ `sx.bs2mtcfetch -f tape-MN`↵

Meaning: `-f` Force option

`tape-MN` Mnemonic name of the MTC device

For further information, see section “Occupying an MTC device when X2000 communication is disrupted” on page 239.

Showing the occupancy status of an MTC device

You can show the occupancy status of an MTC device for the BS2000 systems that share it:

▶ `sx.bs2mtcfetch -l tape-MN`↵

Meaning: `-l` List option

`tape-MN` Mnemonic name of the MTC device

For further information, see section “Displaying the occupancy status of an MTC device” on page 240.

7.4.5 Querying the configuration

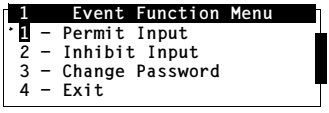
You can output the configuration of the X2000 system:

▶ `sx.chk_conf -h`↵

You can select the quantity of information to be output. The option `-h` outputs a short description of the selection options on screen.

7.4.6 Permitting/inhibiting input and changing a password

F2 opens a menu with operating functions:



The current screen window of the EVENT mode is moved into the background. Any outputs are written to a buffer and output on screen after the menu window has been exited.

Key functions:

↑/↓ or 1/2/3/4	Select menu line
ENTER	Execute menu function

You can start the following activities:

- **1 – Permit Input**

  You can permit input again. The valid password will be requested. If you supply an incorrect password, the system will respond and wait for approximately 6 seconds.

- **2 – Inhibit Input**

  You can lock the EVENT screen against unauthorized inputs. If an input is attempted in locked status, the following message will be output:

  ```
  input locked – type MENU KEY
  ```

- **3 – Change Password**

  You can change the password of the Solaris login `event`: You are asked to enter first the old password and then the new password (twice for security reasons).

- **4 – Exit**

  The menu is closed.

8 The X2000 user interface

The section “Notes on configuring PRIMEPOWER ServerView domains“ applies to SX servers with SMC (and not to the SX server entry-level models). The other sections below apply to all SX servers.

The installation and operation of the graphical user interface of PRIMEPOWER ServerView are described in the manual “PRIMEPOWER ServerView Suite V2.2 – System Administration within a Domain” [5].

In this chapter we simply present an overview of the available functions. Detailed information on the individual functions can be found in the online help system of the *Bs2Devices* and *Tools* applications.

8.1 Notes on configuring PRIMEPOWER ServerView domains

On the SX server, all the partitions and the SMC form an administration domain. For this reason, DomainAdmin and PRIMEPOWER ServerView are installed on all the partitions and on the SMC. By default, the SMC is declared as so-called management server in order to make it possible to administer all partitions in the domain from there. On the SMC, also PRIMEPOWER ServerView should be started.

Only one system administrator can start an application in PRIMEPOWER ServerView in write mode at any one time. In read mode, all the applications can be started as often as required.

8.2 Starting PRIMEPOWER ServerView Suite

You can call PRIMEPOWER ServerView Suite in write mode or read mode. You should note that an application (e.g. *VConfig* or *Bs2Devices*) can only be called in write mode by one user in the domain at any one time. If other users want to start the same application then they will have to start it in read mode.

Write protection in a domain applies to all the management servers!

Operation can be performed:

- via the hardware console (SMC) of an SX server with SMC
- via the local console (or LAN console) of an SX server entry-level model
- via an administration PC
  - using an X server in the Solaris-CDE interface similar to the hardware console
  - using a browser or Java Web Start.
  - via the PC's start menu
  - using the icon for a PC application on the desktop

Starting PRIMEPOWER ServerView at the SX hardware console

Icons have already been created on the CDE interface of the SMC for the predefined logins *sxadmin* and *bs2admin*. Use these to call PRIMEPOWER ServerView. The icons provide a simple, reliable method for calling PRIMEPOWER ServerView locally from the hardware console or remotely from a PC or the X server.

The following screen shows calling PRIMEPOWER ServerView on the CDE interface of the SMC:

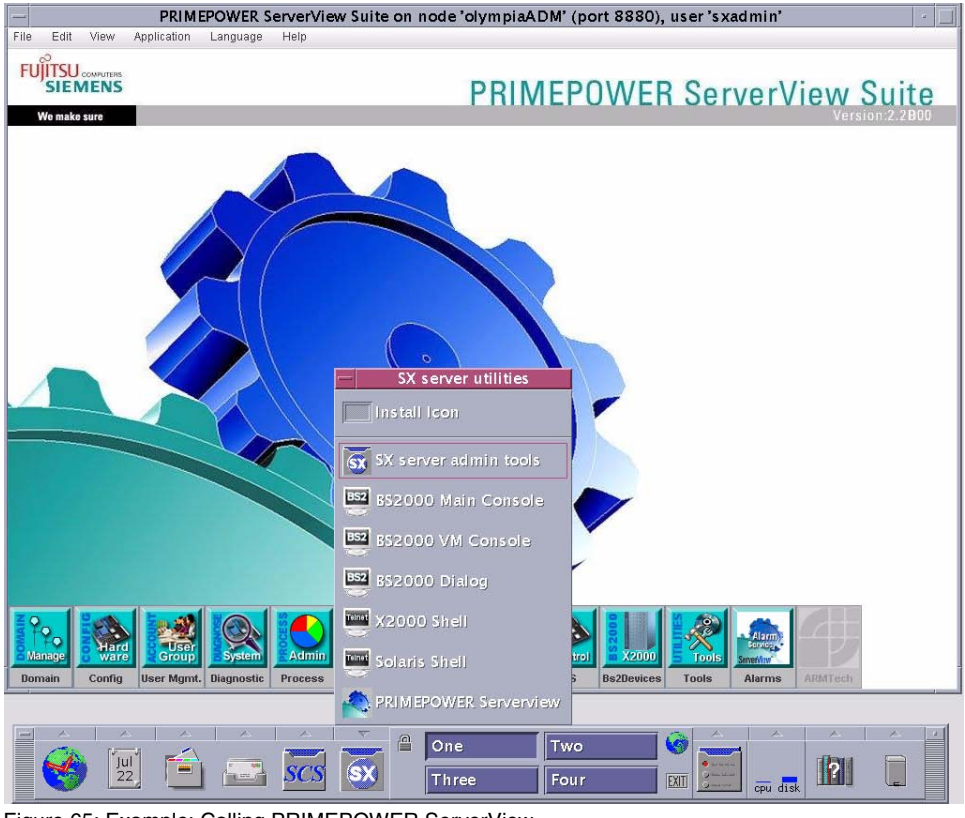


Figure 65: Example: Calling PRIMEPOWER ServerView

Starting on the administration PC

Operation via a browser, Java Web Start or PC application is explained in detail in the manual “PRIMEPOWER ServerView Suite V2.2 – System Administration within a Domain” [5]. Only brief instructions on calling are given at this point.

- Start using the browser
  - ► Start your browser.
  - ► Enter on the URL line:

    `http://<hostname>:8883/`
  - ► Select the relevant link for read or write mode on the page.

- Start using Java Web Start
  - ► Start Java Web Start:

Figure 66: Icon for Java Web Start

JAVA™ Web Start
Sun microsystems
Java
Copyright © 2003 Sun Microsystems, Inc. All rights reserved. Use is subject to license terms. Third-party software, including font technology, is copyrighted and licensed from Sun suppliers. Sun, Sun Microsystems, the Sun logo and Java are trademarks or registered trademarks of Sun Microsystems, Inc. in the U.S. and other countries. All SPARC trademarks are used under license and are trademarks or registered trademarks of SPARC International, Inc. in the U.S. and other countries. Federal Acquisitions: Commercial Software - Government Users Subject to Standard License Terms and Conditions.

Figure 67: Start screen of Java Web Start

Note

Java Web Start is a component of Java and thus dependent on the Java version. This description is based on Java Version 1.4. The figures may differ in a newer version.

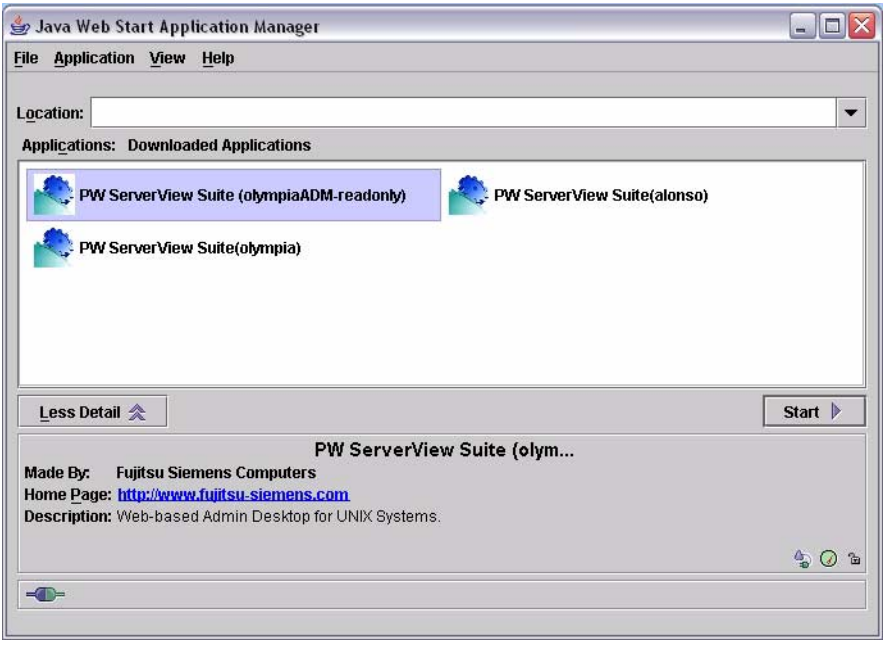


Figure 68: Java Web Start Application Manager

► Select the application and click on the “Start” button.

- Start as a PC application via the PC’s start menu

  ► Start the PRIMEPOWER ServerView Suite via *Start -> Programs -> PRIMEPOWER ServerView Suite -> PRIMEPOWER ServerView Suite*

- Start as a PC application via a desktop icon

  ► Start the PRIMEPOWER ServerView Suite by double-clicking the desktop icon:

Figure 69: Icon for PRIMEPOWER ServerView

After the PRIMEPOWER ServerView Suite has been loaded first the name of the computer on which PRIMEPOWER ServerView is to be loaded is queried, plus the user ID and the associated password. Enter the data for the SMC here.
If a user ID is employed which was created for an administrator role (see the section “User groups and logins” on page 44ff), PRIMEPOWER ServerView runs with root authorization.
Once the PRIMEPOWER ServerView user interface has been loaded, you see the welcome screen:

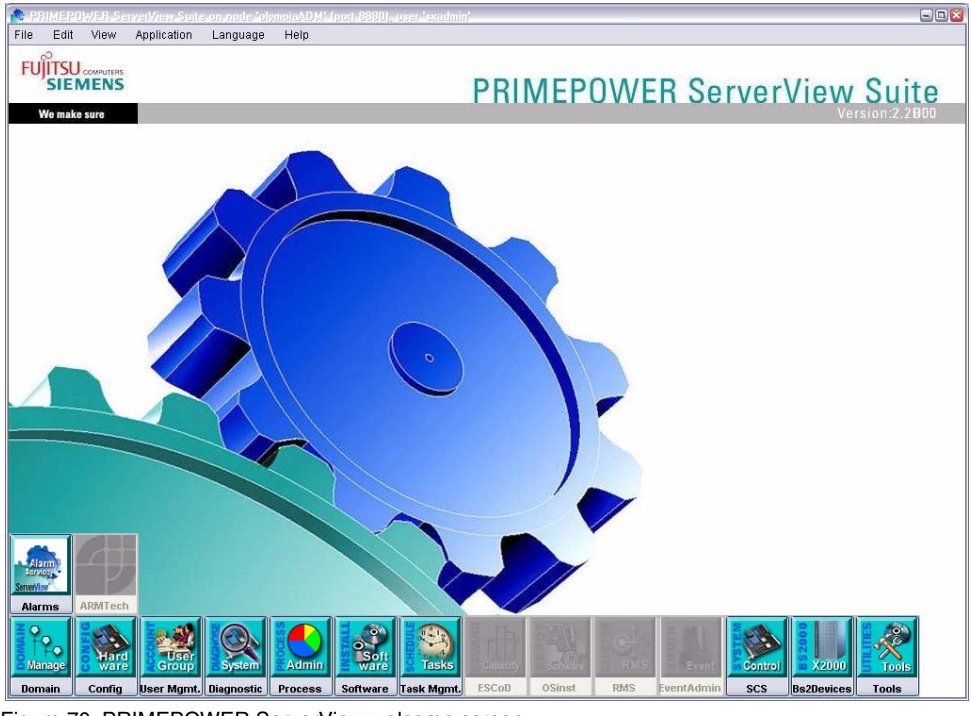


Figure 70: PRIMEPOWER ServerView welcome screen

You can set German or English as the language by selecting *Language* in the menu bar. After you have called an application, it is no longer possible to change the language which then applies to the entire PRIMEPOWER ServerView session.

8.3 Privilege concept with Role-Based Access Control

The PRIMEPOWER ServerView Suite can be used with a standard user ID of the SX servers such as *root*, *sxadmin*, *bs2admin* or *soladmin*. However, a special ID without particular SCS rights can also be set up for this purpose. The procedure for setting up such a user ID is described in the section “Administration of PRIMEPOWER ServerView” on page 53. In all these cases the PRIMEPOWER ServerView Suite runs internally with root rights.

As of V2.2B the PRIMEPOWER ServerView Suite supports differentiated assignment of rights for such user IDs. Differentiated assignment of rights is controlled in the Role Based Access Control (RBAC) feature which is integrated in Solaris.

This means that the user is only granted a restricted view (or the complete view)

- of a defined set of PRIMEPOWER ServerView applications and/or
- of a defined set of nodes within the administration domain.

Applications which are not accessible for users are grayed out in PRIMEPOWER ServerView. Nodes which are not accessible to the user are indicated by the “no entry” icon in the hierarchy browser (see the figure below).

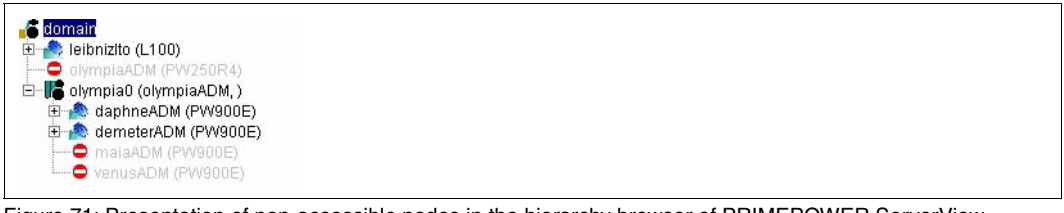


Figure 71: Presentation of non-accessible nodes in the hierarchy browser of PRIMEPOWER ServerView

In the following cases a user ID automatically obtains the full access rights to all available applications of the PRIMEPOWER ServerView Suite and to all nodes of the administration domain when it is created:

- Use of PRIMEPOWER ServerView Suite < V2.2B
- When the user ID is created the RBAC feature is not activated in PRIMEPOWER ServerView.

If the RBAC feature is activated in the PRIMEPOWER ServerView Suite when the user ID is created the user ID is assigned neither access rights to the applications of the PRIMEPOWER ServerView Suite nor to the nodes of the administration domain. User IDs (with the execption of root) which have already been created at this time lose their access rights. These rights must then be assigned (or reassigned) as described below:

To set or modify RBAC authorizations start the PRIMEPOWER ServerView Suite with the root ID on the SMC. Read access to the RBAC authorizations assigned is also possible under another user ID.

Checking and setting the RBAC flag

- In any application of the PRIMEPOWER ServerView Suite click on *Edit -> Preferences* in the menu bar and check the RBAC flag which then appears in the window.

To permit the configuration measures described below the RBAC flag must be set. If this flag is not set, you must set it:

- Click on the relevant check box and then on the *ok* button.
  You must restart the PRIMEPOWER ServerView Suite to set the RBAC flag.

Configuring the user ID

- In the menu bar click on the application *Domain* and *Administration hierarchy -> Modify access permissions*.
- In the *User* register select the user ID to be configured.
  In the *Applications* table you then see all applications of the PRIMEPOWER ServerView Suite and in the *Nodes* table all nodes of the administration domain with the current access settings for this user ID.

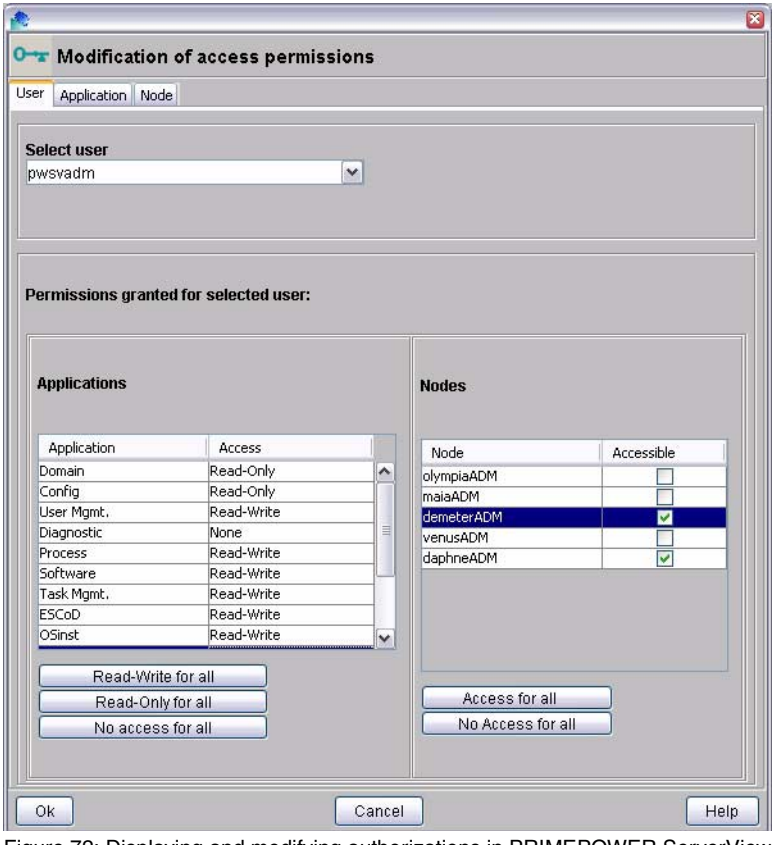


Figure 72: Displaying and modifying authorizations in PRIMEPOWER ServerView

- Modifying access to individual applications

  ► In the *Applications* table mark the relevant line by clicking in the *Access* column. A drop-down menu with the possible access rights then appears and you can select the option you require.

Figure 73: Modifying access to the individual applications in PRIMEPOWER ServerView

- To change the accesses to individual nodes select the check box *Nodes* for the relevant node in the *Access* column.
- General changes for all applications of the PRIMEPOWER ServerView Suite or for all nodes in the administration domain can be made using the relevant buttons.
- Then click on the *ok* button. Here you must ensure that no process is running in Solaris under the user ID concerned or else the change will be rejected.

8.4 X2000 BS2Devices main window

When you click the *X2000 - Bs2Devices* button, you see the *Bs2Devices* user interface:

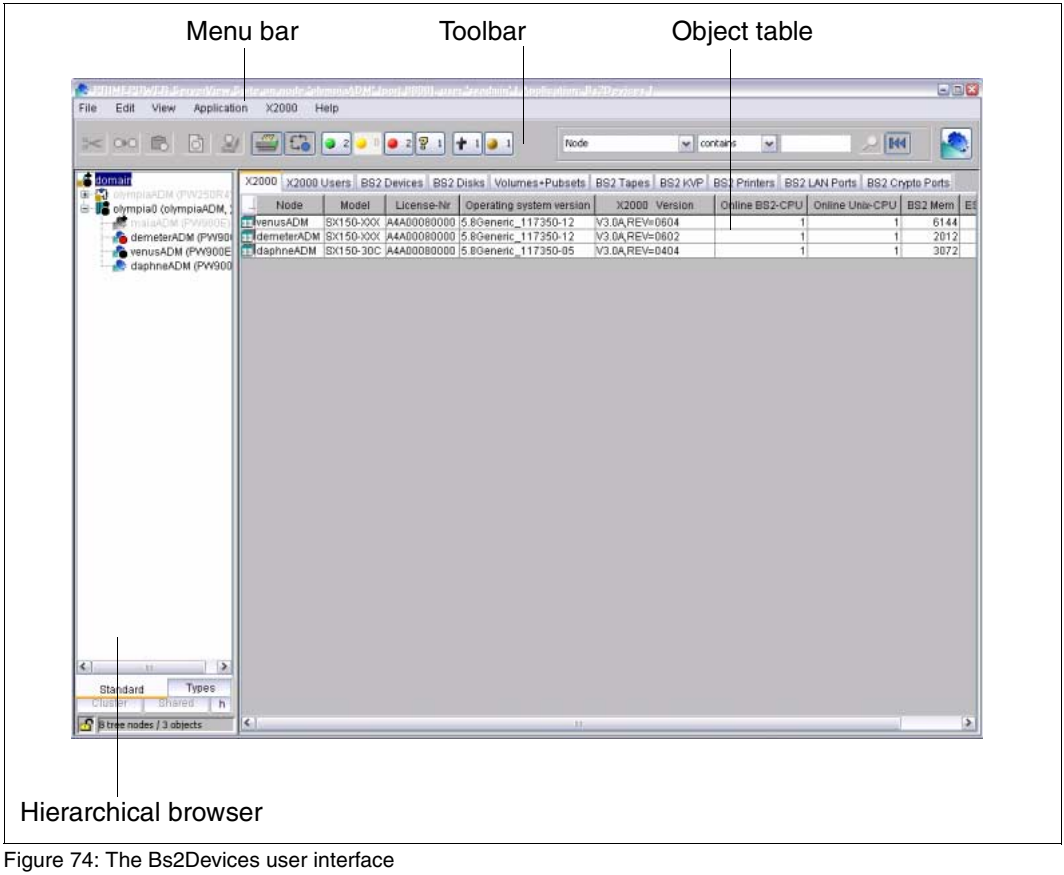

Menu bar
Toolbar
Object table
File Edit View Application X2000 Help
Node
contains
X2000 X2000 Users BS2 Devices BS2 Disks Volumes+Pubsets BS2 Tapes BS2 KVP BS2 Printers BS2 LAN Ports BS2 Crypto Ports
Node Model License-Nr Operating system version X2000 Version Online BS2-CPU Online Unix-CPU BS2 Mem
venusADM SX150-XXX A4A00080000 5.8Generic_117350-12 V3.0A,REV=0604 1 1 6144
demeterADM SX150-XXX A4A00080000 5.8Generic_117350-12 V3.0A,REV=0602 1 1 2012
daphneADM SX150-30C A4A00080000 5.8Generic_117350-05 V3.0A,REV=0404 1 1 3072
Standard
Types
Cluster
Shared
Hierarchical browser

Figure 74: The Bs2Devices user interface

Menu bar and toolbar

You can choose a variety of actions via the menu bar and the toolbar. Some of the functions are context-dependent and are not always available: if an action cannot be executed in a particular context then it is grayed.

Menu bar	Toolbar	Function
File		Print the object list
	–	Export an object
	–	End the session
Edit		Cut an object
		Copy an object to the clipboard
		Paste an object
View		Refresh the display
Application	–	Switch to another application
X2000/ BS2 Users/ BS2 Devices/ BS2 Disks/ Volumes+Pubsets/ BS2 Tapes/ BS2 KVP/ BS2 Printers/ BS2 LAN Ports/ BS2-CRYPTO-Ports		Create an object
	–	Modify an object
		Delete an object
	–	Copy an object to another computer within an administration domain
	–	Possibly other application-specific actions
Help	–	Overview (application-specific)
	–	Contents (application-specific)
	–	About... (version information)
–		Display system information
–		Selection list: select objects
–		Selection list: deselect selected objects
–		Cancel load operation

Table 9: Functions on the menu bar and toolbar

The toolbar also contains the selection configurator:

Figure 75: Example selection configurator

Here you can enter regular expressions to restrict the set of objects for output.

Hierarchical browser

The hierarchical browser helps you to navigate within an administration domain and allows you to select either the entire domain or individual computers within it.

Depending on the selection you make in the hierarchical browser, the object list (see section “Object table” below) displays either the objects of the entire administration domain, the selected level in the hierarchy or the selected computer.

Functions are available only for the selected computers.

Object table

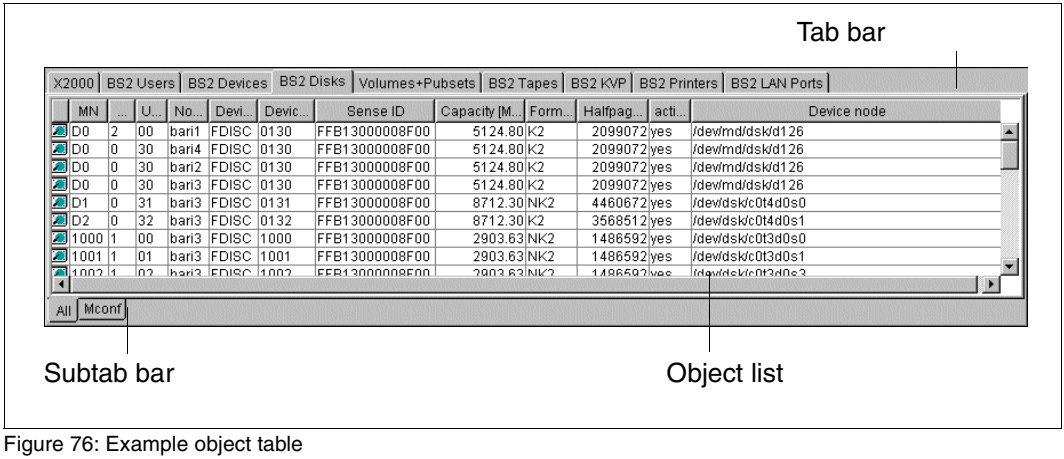

Tab bar
X2000
BS2 Users
BS2 Devices
BS2 Disks
Volumes+Pubsets
BS2 Tapes
BS2 KVP
BS2 Printers
BS2 LAN Ports
MN
...
U...
No...
Devi...
Devic...
Sense ID
Capacity [M...
Form...
Halfpag...
acti...
Device node
D0 2 00 bari1 FDISC 0130 FFB13000008F00 5124.80 K2 2099072 yes /dev/md/dsk/d126
D0 0 30 bari4 FDISC 0130 FFB13000008F00 5124.80 K2 2099072 yes /dev/md/dsk/d126
D0 0 30 bari2 FDISC 0130 FFB13000008F00 5124.80 K2 2099072 yes /dev/md/dsk/d126
D0 0 30 bari3 FDISC 0130 FFB13000008F00 5124.80 K2 2099072 yes /dev/md/dsk/d126
D1 0 31 bari3 FDISC 0131 FFB13000008F00 8712.30 NK2 4460672 yes /dev/dsk/c0t4d0s0
D2 0 32 bari3 FDISC 0132 FFB13000008F00 8712.30 K2 3568512 yes /dev/dsk/c0t4d0s1
1000 1 00 bari3 FDISC 1000 FFB13000008F00 2903.63 NK2 1486592 yes /dev/dsk/c0t3d0s0
1001 1 01 bari3 FDISC 1001 FFB13000008F00 2903.63 NK2 1486592 yes /dev/dsk/c0t3d0s1
All
Mconf
Subtab bar
Object list

Figure 76: Example object table

The object table contains the following areas:

– Subtab bar
– Object list
– Subtab bar

The object list is located below the tab bar. The type and number of the attributes it contains depend on the selected tab or subtab as well as on the selections you have made in the hierarchical browser and the selection configurator in the toolbar.

A subtab bar may be present in the lower display area. Whether or not this is present depends on the selected tab, as do the type and number of subtabs it contains.

8.4.1 Menu functions

8.4.1.1 Function call

There are four ways of calling a function:

1. By selecting the function in the menu bar

Figure 77: Example pull-down menu

2. By highlighting one or more devices in the object list and right-clicking with the mouse

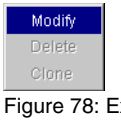


Figure 78: Example context menu

3. By double-clicking an object to open the *Modify* dialog box.
4. By selecting the *Create* and *Delete* tools in the toolbar.

8.4.1.2 Available functions

Whether or not a function is available depends on a number of factors:

- Pull-down or context menu
  The two menus can show different functions from each other. The functions are dependent on which devices are currently highlighted (see below) and, in some cases, on which subtab has been selected (see below).
- Device(s) highlighted or not highlighted
  If one or more devices are highlighted (selected) then device-specific functions are presented in the menus. These functions apply only to the highlighted devices.
- Selected subtab
  Subtabs are available whenever you select one of the following tabs:
  - BS2 Disks
  - Volumes+Pubsets
  - BS2 Tapes
  - BS2 Printers

  Different functions are available depending on the selected subtab.

8.4.1.3 Function types

Various types of function are available for X2000 operation:

- General functions

  These functions are available throughout PRIMEPOWER ServerView Suite. They are:
  - Create
  - Modify
  - Delete
  - Clone

  The *Create* function is not available in the drop-down menu.

  The *Modify* and *Delete* functions are only available if one or more devices are highlighted and if the device properties permit the use of these functions.

  The *Clone* function is never available in the X2000 user interface.

- X2000-specific functions

  These functions are only available in the pull-down menu in the X2000 user interface.

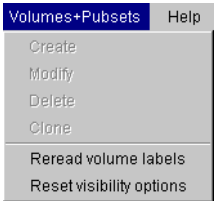


Figure 79: Example pull-down menu: “Volumes+Pubsets”

- Device-specific functions

  These functions apply to specific devices. They can only be called if one or more devices have been highlighted in the object list. These functions are available both in the pull-down menu and in the drop-down menu.

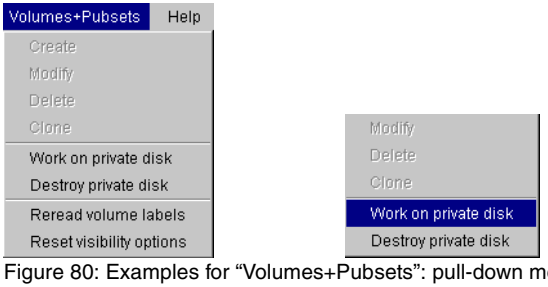


Figure 80: Examples for “Volumes+Pubsets”: pull-down menu and drop-down menu

8.4.1.4 Functions

The following explanations illustrate all the functions that are available in the various tabs of *BS2Devices*. The functions that actually appear in the menu depend on which menu is selected, the highlighted devices and the selected subtab.

For a detailed description of the functions, refer to the online help system and the chapter “Global X2000 functions” on page 221.

(A) General functions
(X) X2000-specific functions
(G) Device-specific functions

X2000

Display and modify of general system information

From X2000 V2.5 onwards, the menu items *Mirror*, *CSR* and *PSR* are integrated in the PRIMEPOWER ServerView application *Tools* and can be activated from this.

- Modify (A)
  Assign processors and main memory to the BS2000 and X2000 systems. Set the VM mode and the number of VM2000 guest systems.

BS2 Users

List of all user IDs known to the system

- Change passwords (G)
  The password can be modified for one or more highlighted user IDs.

BS2 Devices

List of all configured BS2000 devices

- Delete (G)
  Deletes one or more highlighted devices

BS2 Disks

Configuration of BS2000 disks

Different functions are available depending on the selected subtab:

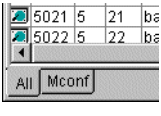


Figure 81: “BS2 Disks” subtab

(a) All
(b) Mconf

- Create (Aab)
  Configures a BS2000 disk on a selected disk partition. A disk partition is only proposed if it is unused. This means that it is:
  – not configured as a BS2000 disk,
  – not active as Solaris partition,
  – not mountet as file system
  – not entered in the configuration file `/etc/vfstab`,
  – not active as a swap area.
  Only those disks can be created which were specified beforehand using the *Assign disk selection* statement.
- Modify (Aa)
  The configuration data for the highlighted BS2000 disk is displayed. Some of this data can be modified.
- Delete (Aa)
  The highlighted disks are deleted from the BS2000 disk configuration. The data on the disks is not deleted.
- Partition and configure BS2000 disks (Gb)
  You can select one or more disks for which “partition” is displayed in the *Possible Actions* column. These disks are partitioned and the partitions are configured as BS2000 disks. The data on the disks can no longer be accessed and will be partly defective.
  If the disk is connected via a fibre channel, two different disk types (D3435 and D3475-D) can be generated; in this case the disk type D3435 is not partitionable).
- Import and configure BS2000 disks (Gb)
  You can select one or more disks for which “import” is displayed in the *Possible Actions* column. The partitions are configured on the basis of their BS2000 parameters (e.g. NK2). This action does not delete the data on the disk.
- Label disks (Gb)
  The disks are initialized with a valid partition table.
- Assign disk selection (Aab)
  Here you can restrict the selection of disks displayed. In the case of large disk configurations this reduces the time for setting up the subregister *Mconf*. The “*Create*” action also only offers disk partitions which belkong to this disk selection.

Volumes+Pubsets

Configuration and initialization of pubsets and private disks for use under BS2000 and BS2000 installation

Different functions are available depending on the properties of the highlighted objects and the selected subtab:

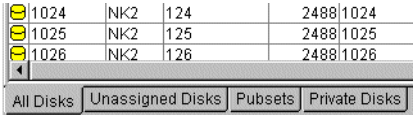


Figure 82: “Volumes+Pubsets” subtab

(a) All Disks
(b) Unassigned Disks
(c) Pubsets
(d) Private Disks

- Overwrite svl lock (Gabcd)
  The highlighted objects are released for editing.
- Work on pubset (Gc)
  The highlighted object is a pubset or the Sysres disk of a pubset that can be modified. This function can also be used to install BS2000.
- Destroy pubset (Gac)
  The highlighted objects are pubsets or Sysres disks of pubsets that can be deleted.
- Work on private disk (Gad)
  The highlighted private disk can be modified.
- Destroy private disk (Gad)
  The highlighted private disks can be deleted.
- Reread volume labels (Xabcd)
  The VSNs are reread in order to refresh the overviews. This is necessary if the configuration has been modified or if BS2000 has processed the disk.
- Define pubset (Gab)
  A new pubset is created and the highlighted disk becomes the Sysres disk. This function can also be used to install BS2000.
- Define private disk (Gab)
  The highlighted disk becomes a private disk.
- Reset visibility options (Xabcd)
  The menu is reset to the default values, i.e. the comment boxes are output again.

BS2 Tapes

Configuration of BS2000 tapes

The functions are offered depending on the selected subtab:

– Configured Tapes
– Not configured Tapes

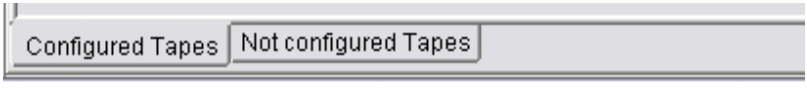


Figure 83: “BS2 Tapes” subtab

The BS2000 tape devices supported are described in the online help “BS2 tapes - Creating“ (for MBKs, see also section “Magnetic tape cartridge devices” on page 232). The DVD/CD-ROM drive (of the SMC or entry-level model) may be used as a tape device. If the conditions regarding CD ROMs are not met (see online help), an ATTACH in the BS2000 is rejected with IVRQ and the medium is then unloaded.

In the case of DVD and CD-ROM drives a `DETACH-DEVICE` and `UNLOAD-TAPE` in BS2000 do not unload the medium. The unloading must be activated manually using the command `eject` or by using the menu item “Eject” in the file manager of the Solaris-CDE interface.

- Create (Aab)
  A BS2000 tape device can be configured.
- Modify (Aa)
  The selected BS2000 tape device is displayed and can be modified.
- Delete (Aa)
  The highlighted BS2000 tape devices are deleted.
- Activate tape devices (Ga)
  The highlighted and not active BS2000 tapes are activated.
- Deactivate tape devices (Ga)
  The highlighted and active BS2000 tapes are deactivated.
- Configure BS2000 tapes (Gb)
  The highlighted tape devices are configured as BS2000 tapes.

BS2 KVP

When the tab BS2-KVP is activated, all configured KVPs (console distribution program) are listed. The KVP is responsible for the BS2 console inputs and outputs. A KVP always consists of 2 devices (write and read path), and in the event of modifications the write path must always be clicked. A new KVP is required if an additional guest system is set up. The KVP is identified by the KVP name which consists of 3 characters. The KVP for the native system or monitor system is already active after the installation, is called *Hypervisor-KVP* and has the name `HVO`. All further KVPs must be set up via tab BS2-KVP.

- Create (A)
  A KVP can be configured.
- Modify (A)
  The selected KVP is displayed and can be modified.
- Delete (A)
  The highlighted KVPs are deleted.
- Show or modify user ids (G)
  The KVP user IDs are displayed and can be modified.
- Show or modify logging files (G)
  The existing KVP logging files are listed. You can now display, delete or create additional logging files.
- Show or modify logging options (G)
  The properties of the logging process are displayed and can be modified.
- Start KVP (G)
  The selected KVP system is started.
- Stop KVP (G)
  The selected KVP system is stopped.
- Activate new configuration (G)
  The changes to the KVP system (logging, user IDs etc.) are activated.
- Configuration of automatic IPL (G)
  The automatic startup of the BS2000 (applies only to the native system or monitor system) can be configured. This means that BS2000 will be started automatically after loading of X2000 is complete.
- System add (X)
  A new KVP system can be added. The KVP must already have been configured.
- System delete (X)
  The selected KVP system is deleted.

- Evaluation of shutdown (X)
  If Solaris is terminated for any reason, then automatically the first action performed is to terminate BS2000. You can define a command of your choice (default: `/shutdown`) and a maximum wait time (default: 30 minutes) in this menu.

BS2 Printers

Configuration of printers

Different functions are available depending on the selected subtab:

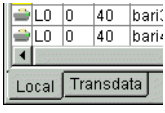


Figure 84: “BS2 Printers” subtab

(a) Local
(b) Transdata

- Create (Aab)

  Submenus:

  – BS2000 printer
    You can configure a local BS2000 printer.

  – Transdata printer
    You can configure an emulated TRANSDATA printer.

- Modify (Aab)
  The highlighted BS2000 printer or emulated TRANSDATA printer is displayed and you can modify it.

- Delete (Aab)
  The highlighted local BS2000 or emulated TRANSDATA printers are deleted.

BS2 LAN Ports

List of all configured LAN ports

- Create
  You can configure a BS2000 LAN port.
- Modify
  The highlighted BS2000 LAN port is displayed and can be modified.
- Delete
  The highlighted LAN ports are deleted.
- Diagnostics
  Diagnostic information for selected LAN ports can be displayed.
- Configuration
  Autonegotiation, Duplex mode & Linespeed for LAN Controller and a monitoring timer for managing controller failure messages can be configured.
- SlanDebug
  Setting may only be made when you are instructed to do so by the service personnel.

BS2 Crypto Ports

Encryption algorithms are made available for BS2000 via the BS2000 crypto ports. These algorithms can only be used with the corresponding license *open*CRYPT-SOFT (for information on cryptography please also refer to the manual "*open*CRYPT (BS2000/OSD)" [15]). A BS2000 crypto port always consists of 2 devices (a write device and a read device).

Listing of all configured BS2000 crypto ports

- Creating (A)
  A BS2000 crypto port can be configured.
- Modifying (A)
  The marked BS2000 crypto port is displayed and can be modified.
- Deleting (A)
  The marked BS2000 crypto ports are deleted.

8.4.2 X2000 tools main window

When you click on the *X2000 - Tools* button the *Tools* interface appears (see figure 122 on page 332):

Clicking on the *Tools* button offers the following functional areas:

Figure 85: *Tools* button

- Mirror (X)
  Prepare and configure system disk mirroring
- CSR: back up configuration data (X)

  Back up and restore the configuration data
- PSR: physical backup (X)

  PSR is a tool for the physical backup and restoring of data. Disks or individual slices of these disks can be physically written onto a backup medium and later re-read from it. The PSR is operated in two modes:

  – The offline PSR is described in the section “Offline PSR” on page 274. When the offline PSR is running it is not possible to work with BS2000.

  – The online PSR operates in parallel with Solaris or BS2000. It is called via this point in the PRIMEPOWER ServerView. The disks not used by Solaris and BS2000 can be backed up. The system disk can also be backed up with the online PSR if a mirror is switched to a standby disk and therefore frozen. The backup can be performed in this state and the mirror regenerated.

8.4.3 Online help

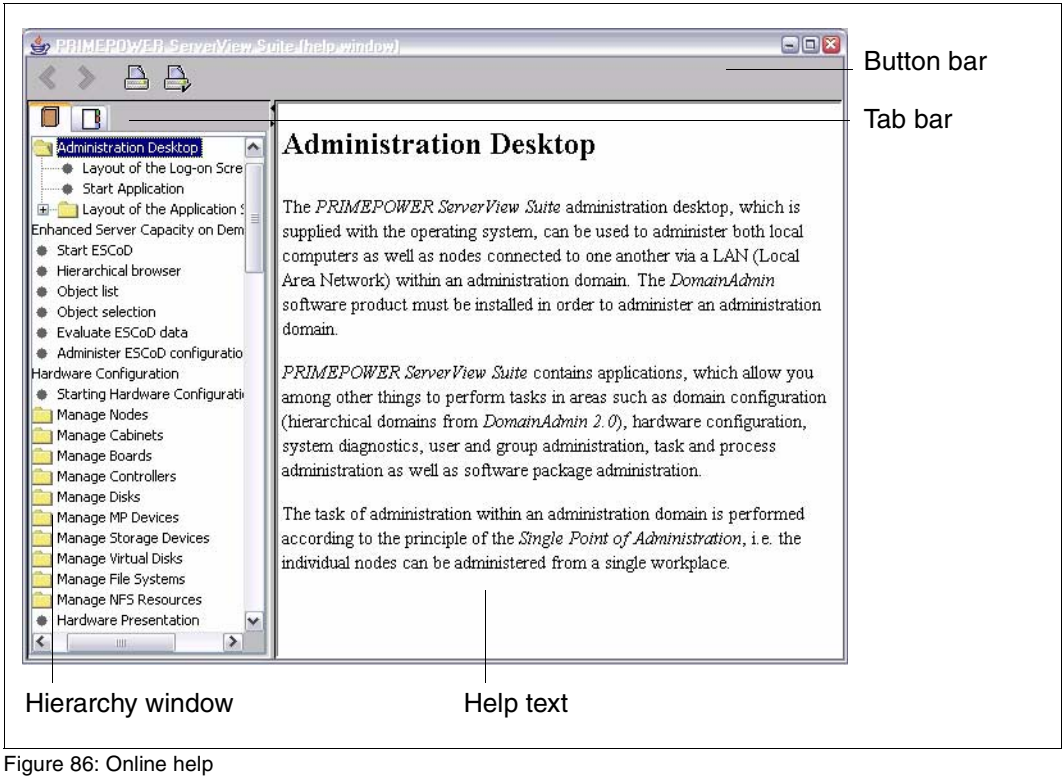

Button bar
Tab bar
Administration Desktop
Layout of the Log-on Scre
Start Application
Layout of the Application S
Enhanced Server Capacity on Dem
Start ESCoD
Hierarchical browser
Object list
Object selection
Evaluate ESCoD data
Administer ESCoD configuratio
Hardware Configuration
Starting Hardware Configurati
Manage Nodes
Manage Cabinets
Manage Boards
Manage Controllers
Manage Disks
Manage MP Devices
Manage Storage Devices
Manage Virtual Disks
Manage File Systems
Manage NFS Resources
Hardware Presentation
Administration Desktop
The PRIMEPOWER ServerView Suite administration desktop, which is supplied with the operating system, can be used to administer both local computers as well as nodes connected to one another via a LAN (Local Area Network) within an administration domain. The DomainAdmin software product must be installed in order to administer an administration domain.
PRIMEPOWER ServerView Suite contains applications, which allow you among other things to perform tasks in areas such as domain configuration (hierarchical domains from DomainAdmin 2.0), hardware configuration, system diagnostics, user and group administration, task and process administration as well as software package administration.
The task of administration within an administration domain is performed according to the principle of the Single Point of Administration, i.e. the individual nodes can be administered from a single workplace.
Hierarchy window
Help text

Figure 86: Online help

You can call the online help system in two ways:

- by choosing *Help* -> *Contents* in the menu
- by clicking the *Help* button in a window

  Every function window contains a *Help* button at the bottom right. When you click this button, the online help window opens (see figure 86). Unlike when you call the help system via the menu, a help text relating to the function window is output in the help text window.

Tab bar

The *Content* and *Index* tabs are located above the left-hand display window. Depending on the selected tab, different information is displayed in the two output windows:

“Contents” tab

The left-hand window lists all the PRIMEPOWER ServerView Suite sections and subsections for which relevant information can be found in the online help system. Once you have clicked on the required topic, the help information is output in the help text window.

“Index” tab

The hierarchy window lists all the keywords and topics for which relevant information can be found in the online help system. Once you have clicked on the required keyword or topic, the help information is output in the help text window.

Above the hierarchy window you will find a text box which allows you to search for specified terms.

- ► Enter the search term or search string here.
- ► Press the Return key.

  If the term you are searching for is present in the index then the corresponding information is output in the right-hand window. If it is not present then nothing happens.
- ► Press the Return key to continue the search.

The “search term” can be a string of your choice. The search is not case-sensitive.

Example

If you enter “snmp entr” then you will see information on the topics *Create SNMP Agents*, *Delete SNMP Agents* and *Modify SNMP Configuration*.

Button bar

Button bar functions

- Scroll forwards
- Scroll backwards
- Print
- Set up page

9 Global X2000 functions

9.1 BS2000 disks: Configuration and BS2000 installation

9.1.1 Internal SCSI disk

This chapter explains all the steps required to operate a brand new or partitioned internal SCSI disk as a BS2000 disk. An internal SCSI disk is in principle created as a D3475-8F disk. The points below indicate the possible state of the disk and how to manage it:

1. The disk has not yet been labelled (brand new):

   In the tab *BS2 disks -> Mconf* the entry for this disk in the column *Possible actions:* indicates “Label”. Select the disk and execute the action “label”.

2. The disks has been labelled but has not been configured for Solaris or BS2000 use:

   In the subtab *Mconf* the entry for this disk in the column *Possible actions* indicates “Partitions”. Select the disk and execute the action *Partition and configure BS2000 disks*. With this action up to 7 slices are generated and configured as BS2000 disks. These slices are all the same size and all have the same format (KEY, NK2, NK4). Existing data on the disk are lost. See also point 4.

3. A new disk has already been partitioned:

   The subtab *Mconf* shows the entry “Import” for this disk in the column *Possible actions*. In other words, all the slices of this disk have already been configured once with the action *Partition and configure BS2000 disks*.

   a) These partitions can be made known to the system as BS2000 disks with the action *Import and configure BS2000 disks* without loss of data.

      Importing and configuring is only possible when all the partitions are of the same size and have the same format!

b) The slices on the disk can be configured individually as a BS2000 disk in the tab *BS2 disks* with the action *Create*. The format can also be changed individually with this action.

CAUTION!
An *import* with different formats is not possible later.

4. The slices are configured as BS2000 disks:

   The entry “none” is shown in the column *Possible actions*.

The BS2000 disks are now available to BS2000 and can be accessed using their mnemonics.

They can now be initialized with the tab *Volumes+Pubsets* (see points 5 - 8) or processed with VOLIN/SIR from BS2000.

To ensure that switching between *Volumes+Pubsets* and another tab does not take too long, the database is only generate and the maintained when *Volumes+Pubsets* is started for the first time. Changes via PRIMEPOWER ServerView are automatically accepted but changes via SIR/VOLIN or hardware switching are not accepted. The action point *Re-read VSNs + Update display* is therefore provided for these cases to set the database and therefore the display, if necessary, to the current status.

5. Create pubsets and private disks, including the corresponding initialization for immediate use under BS2000.
6. Preparation for disk mirroring at BS2000 level with the product DRV.
7. Change of pubset name and system ID.
8. Installation of BS2000 on a pubset.

Activities 5 - 8 can be executed by means of the tab *Volumes+Pubsets* (see section “Functions” on page 210). You can obtain more detailed information from the on-line help for this tab, which also describes the procedure for some standard tasks and the procedure to be adopted in the event of errors.

The tab *Volumes+Pubsets* can only process configured BS2000 disks. It is also not possible to change the format with this tab.

When activities 5 - 8 are executed BS2000 may not process the disks concerned. This means that the disks must be detached. Initialization and BS2000 installation cause all data on the disks to be lost. After a name change (activity 5) the pubset concerned must be imported as “regenerated” (`IMPORT-PUBSET` with the operand `ACTUAL-JOIN=*FIRST`). All the user IDs of the pubset are therefore lost and must be backed up beforehand where necessary. The first startup after the re-installation of a BS2000 must also be executed with a dialog startup and corresponding inputs when importing the home pubset.

9.1.2 Fibre Channel disks (RAID systems)

Two different disk types can be created on the Fibre Channel disks (for the usage scenarios see section “Rules of usage for disks D3435 and D3475-8F” on page 230). The alternatives are:

– a D3435 disk or
– a D3475-8F disk

If type D3475-8F is chosen the disk could be partitioned, but it should not partitioned if MirrorView/SnapView in FibreCat or SRDF and TimeFinder in Symmetrix (contained in Symmetrix host component = SHC-OSD) is to be used later because in this case the smallest administrative unit is an LUN (logical unit = 1 logical disk). The required disk sizes should always be set with RAID resources. One LUN should always correspond to one BS2000 disk.

Configuration:

If the tab *BS2 disks (Mconf)* is selected, all possible BS2000 disks are listed on it. The following actions are proposed: *partition* and/or *import*. You can now *import and configure* or *partition and configure* the disk:

1. import and configure

   In the case of *import and configure* the data on the disk remain unchanged and the volume(s) is/are made available to BS2000. To obtain an overview of what will be configured, press the button “Preview”; nothing else will be done. An interrupt is still possible if this configuration is not required.

2. partition and configure

   In the case of *partition and configure* the disk type is freely selectable and you can select either disk type (D3435 or D3475-8F). The number of BS2000 disks on an LUN can also be specified from 1 to 7 in the case of D3475-8F. Only slices of the same size can be generated. In the case of partitioning, the disk is always overwritten. There is always only 1 slice for disk type 3435.

After the configuration “none” appears in the column *possible actions*.

D3475-8F — The LUN has now been divided into 1 - 7 BS2000 disks of the same size. All disks have the same format: KEY, NK2 or NK4. These BS2000 disks can be initialized with *Volumes+Pubsets*. Points 5 - 8, with the explanations from section “Internal SCSI disk” on page 221, also apply to these Fibre Channel disks.

D3435 — One D3435 disk per LUN has been configured. The format and the initialization of the disk can only be written from BS2000 via SIR and/or VOLIN. *Volumes+Pubsets* are not therefore available for the D3435 disks.

9.2 Mirroring of internal disks in X2000

As of X2000 V2.5 this function is offered in the *Tools* application of the PRIMEPOWER ServerView Suite.

To increase high availability of system disks, the system disk of the SX server is mirrored. The internal disks are here mirrored with the functions provided by “Solstice Disk Suite”.

In this case a mirror of the system disk can be conveniently set up by means of the PRIMEPOWER ServerView interface and individual disks can be deactivated.

The basis of this concept is a mirror disk consisting of two or three individual disks. Here a disk can be configured as a standby disk which can be backed up on-line or from which a backed up software status can be started up after “SW damage”.

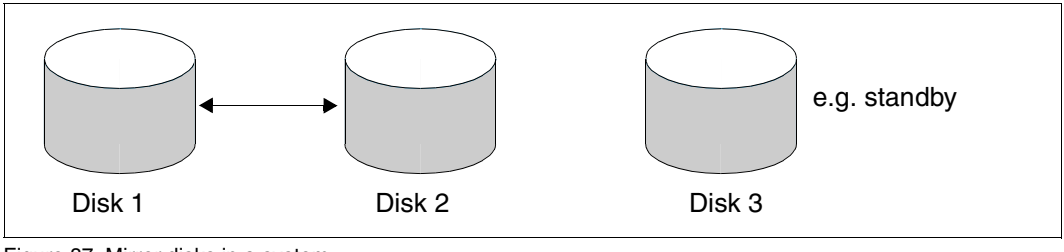


Figure 87: Mirror disks in a system

9.2.1 PRIMEPOWER ServerView Suite interface

- ► Click on the tab *Tools*.
- ► Select the function *Mirror* in the pulldown menu *Tools*.

  The menu field *Mirror configuration* is opened:

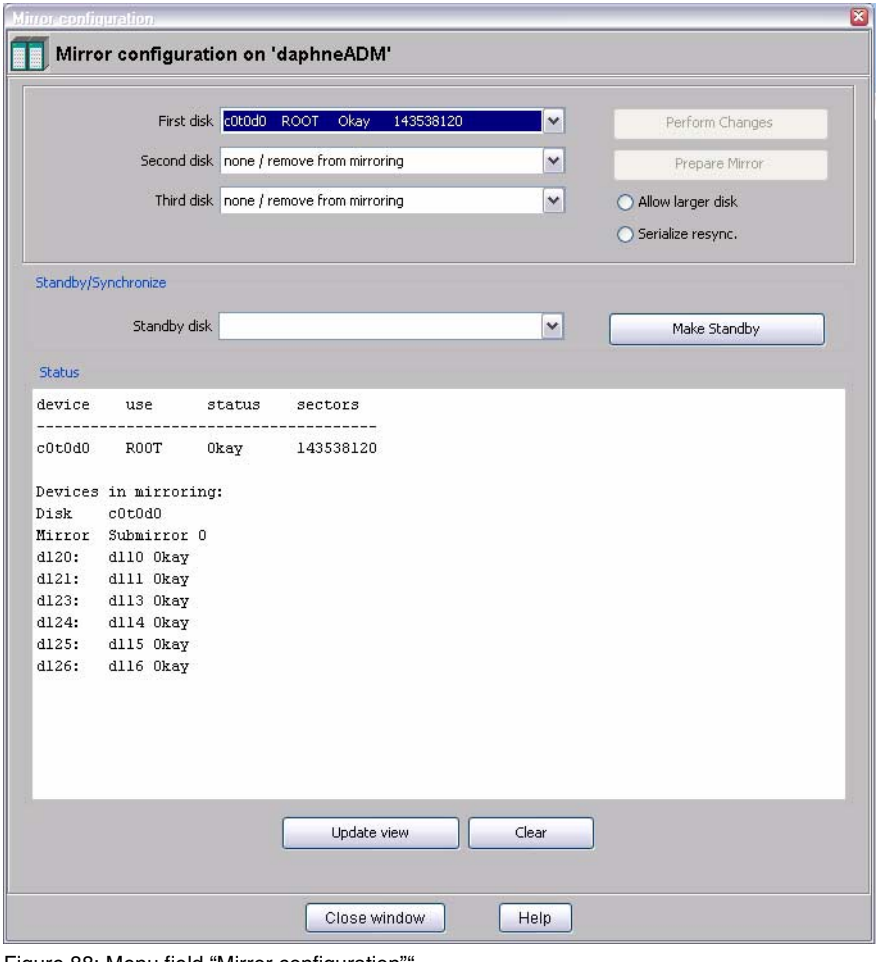


Figure 88: Menu field “Mirror configuration”“

This menu field has the actions required to administer a mirror boot disk:
– Set up a mirror disk
– Add a disk to the mirror system (page 227)
– Remove a disk from the mirror system (page 227)
– Switch a disk from the mirror system to “standby” (page 227)
– Synchronize a standby disk (page 227).

The following options are available:
– Allow larger disk
– Serialize resync.

9.2.1.1 Window of the boot mirror disk

The outputs of the last action plus the status of the boot mirror disk are displayed in the status window.

9.2.1.2 Actions

Set up a mirror disk

The button *Prepare mirror* is activated when no mirror disk is yet available in the system. If this is the case the root disk is proposed in the field *First disk* and can be prepared for the mirror:

► Click the button *Prepare mirror* (see figure 88 on page 225)

► Click the button *OK* (see figure 88 on page 225)

At this point you must confirm that you do indeed want to prepare the disk for mirroring.

► Click the button *OK*

A prompt asks if you want to carry out a reboot.

► Click the button *Yes*.

i If you click the button *No*, the boot disk is not set up for mirroring until the next reboot.

The message that the PRIMEPOWER ServerView interface has lost the connection to the host then appears.

► Click the button *OK*

After the reboot further disks can be included in the mirroring.

Add a disk to the mirror system

To add one or two disks, select one or two free disk and then activate them by clicking *Execute change*.

With the *Allow larger disk* option disks with a larger capacity than the system disk are also offered.

The action must be confirmed in a window for each disk selected. Here the disk is added and the synchronizing process started up.

If the *Serialize resync.* option is active, the disks are synchronized one after the other.

A disk can be removed from the mirror during a synchronization.

Remove a disk from the mirror system

To remove one/two disk(s) from the mirror, select one/two disk(s) then activate them.

Confirm the action for each disk selected.

Switch a disk from the mirror system to “standby”

A disk can be removed from the mirror and switched to “standby” by selecting a disk as the *standby disk* and then activating *switch to standby.*

Confirm the action.

Synchronize a standby disk

To synchronize a standby disk, click the button *Synchronizing.*

If the *Serialize resync.* option is active, the disks are synchronized one after the other.

Confirm the action.

9.2.2 Error situations

9.2.2.1 Replacing a defective disk

After a defective disk is replaced by the service engineer the disk must be logically removed from the mirror configuration then added to it again (see page 227).

9.2.2.2 Disk failure

2-disk configuration

A 2-disk configuration will survive the failure of one disk. The error in current operation can be eliminated by replacing the defective disk (see previous section).

If a boot/reboot is carried out after a disk failure, the boot is rejected because the “Solistice-DiskSuite” rule (more than half of all metadatabase devices) has been broken.

In such a case the system administrator must log on in the single-user mode and delete the metadatabase devices of the defective disk.

The defective device is determined with the command `metadb`.

The metadatabase of the defective disk `c0t0d0` in the example here, can then be deleted with the command, e.g. `metadb -f -d /dev/dsk/c0t0d0s7`.

The system can then be started with the remaining disk with the command `reboot`.

The system administrator can prevent these actions by deactivating the defective disk using the PRIMEPOWER ServerView in the mirror configuration before a reboot.

3-disk configuration

A 3-disk configuration will survive the failure of one disk. A reboot is also possible if this error occurs.

If a second disk fails (double error), the system operation is interrupted by a panic and the system starts in single-user mode. Here too the defective metadata devices can be deleted with the commands described above and the system can then started up with a disk by means of `reboot`.

9.3 Additional information for disks

9.3.1 Default partitioning of the root disk

There are default partitionings of the system disk already defined for Solaris installations for X2000. The table below shows the division of 36 GB and 72 GB disks:

No.	Type	Slice size in MB		Comment
		36 GB disk	72 GB disk	
0	ROOT	8192	8193	/ (with /opt, /export/home, /usr, /var, without /var/crash)
1	SWAP	8192	8193	Swap area
2	BACKUP	34852	70087	Whole disk
3	VAR	8192	12290	contains /var/crash
4	ALTERNATES	0	17633	not used
5	ALTERNATES	0	17633	not used
6	ALTERNATES	6170	6132	BS2000 disk
7	BOOT	10	12	Meta DB (e.g. in mirroring)

Slices 6 and 7 (36 GB disk) and 4 to 7 (72 GB disk) must be reserved for the installation. These slices are automatically set up when starting X2000 for the first time.

The unused slices 4 and 5 can be configured as BS2000 disks of the type D3475-8F using PRIMEPOWER ServerView.

ROOT contains all data file directories

SWAP Solaris itself requires hardly any swap area. The size of the swap area depends only on the current applications and should therefore be 1-2 times the main memory size.

BACKUP covers the entire disk and is the only slice which overlaps the other.

VAR contains /var/crash and therefore receives all the dumps.

ALTERNATES emulated BS2000 disks.

9.3.2 Rules of usage for disks D3435 and D3475-8F

D3475-8F

- An LUN is divided into 1-7 slices of the same size. Here the BS2000 format (KEY, NK2, NK4) may be selected and configured. The disk can be initialized via PRIMEPOWER ServerView for BS2000 operation. Where necessary an IPL-compatible BS2000 can be placed on the disk
- Only this type can be used for internal SCSI disks.
- In the case of Fibre Channel disks this disk type must be used if an LUN is to be divided into several BS2000 disks.

CAUTION!
If MirrorView/SnapView is used for FibreCat, or if SRDF and TimeFinder are used for Symmetrix, D3435 is the strictly recommended disk type.

D3435

- One BS2000 disk is made available for each LUN.
- If MirrorView/SnapView is used for FibreCat, or if SRDF and TimeFinder are used for Symmetrix, D3435 is the recommended disk type.
- If there is sharing with Fibre Channel channel disks of an S server, this type of disk must be used.
- If a Symmetrix disk in FBA format is now operated by the customer on the ESCON channel, this disk can be reconfigured to a Fibre Channel connection of Symmetrix and processed further as DS3435 without changing the data. It is also said that the disk can be switched. This makes it suitable for data migration. In shared operation, however, this disk can only be operated by the SX and S servers to which it is connected by Fibre Channel.

Table for sharing (sh) and switching (sw) between system types:

	SX1xx - D3475-8F	**SX1xx - D3435**
SX1xx – D3475-8F	sh + sw	-
SX1xx – D3435	-	sh + sw
SR2000/DS2000 – D3475-8F	-	-
S1xx – fibre channel connection	-	sh + sw
Symmetrix – ESCON – FBA-Format	-	sw
Symmetrix – ESCON – CKD-Format	-	-

Table 10: Sharing (sh) and switching (sw) between system types

9.3.3 Change of format from disk D3435 to disk D3475-8F

Change of format from D3475-8F to D3435 or from D3435 to D3475-8F:

1. The BS2000 disks in the BS2000 must first be detached. These disks must then be deconfigured (deleted) on all the X2000s by means of *BS2 devices* or *BS2 disks (All)*.
2. Select the disk concerned under *BS2 disks (Mconf)*. The disk should now be available and the action *partition/import* should be proposed. If this is not the case you must repeat point 1. After this there is still at least 1 slice which is still occupied.
3. You can now call *partition and configure*. You can select any disk type and additional parameters.
4. To display the future BS2000 disk, select the “Preview” button.
5. The configuration is not executed until the OK button is pressed.

9.4 Magnetic tape cartridge devices

Multiple systems can be granted access to the same magnetic tape cartridge device in a “Storage Area Network” (SAN). Such an environment requires the connected systems to be synchronized. If they are not coordinated it is not possible to operate the MTC device properly even if you ensure that only one application ever uses the device at a time because tests are performed periodically by the systems which can result in the position of the tape being changed and thus to read or write errors in the application.

X2000 coordinates operation of the MTC device in a homogeneous network of X2000-based BS2000 systems in which the MTC device is configured as described below.

While this configuration has not been completed for all connected systems no MTC device may be used on an X2000-based BS2000 system.

Nor may an MTC device be used on an X2000-based BS2000 system if a system of a different type (BS2000 S server, Solaris, Linux, etc.) can access the device.

In X2000 MTC devices have the configuration type `NTTAPEO`, `NTTAPEA`, `MKTAPEO` or `MKTAPEA`. X2000 supports alternate exclusive use of a correctly configured MTC device by multiple X2000-based BS2000 systems.

The exclusive use of an MTC device by a BS2000 system is started by issuing the command `ATTACH-DEVICE` for the device or by assigning the device in SLED.

An MTC device becomes free for exclusive use at another BS2000 system when it is released with the command `DETACH-DEVICE` or by SLED.

Any attempt to occupy an MTC device that is being used by another BS2000 system will be rejected (with the message text `ASSIGNED ELSEWHERE`).

9.4.1 Basic conditions for configuration

1. The X2000-based BS2000 systems which are able to access the MTC device in the SAN must be administered via a joint PRIMEPOWER ServerView management server (this means among other things: the DomainAdmin product of the PRIMEPOWER ServerView Suite must be installed on these systems).
2. The MTC device must possess the same device mnemonic in each BS2000 system.
3. In the PRIMEPOWER ServerView a list of all the BS2000 systems which can access the tape device must be created.
4. During the time in which a system has access to the MTC device but is not yet or no longer entered in the list of systems, the MTC device may not be used on any system.

9.4.2 Configuring an MTC device

There are two steps involved in configuring an MTC device in the PRIMEPOWER ServerView application *Bs2Devices* :

1. The MTC device must be configured as a BS2000 device at each system (= Node in PRIMEPOWER ServerView node) from which it is accessible (*BS2 Tapes* -> *Create*):

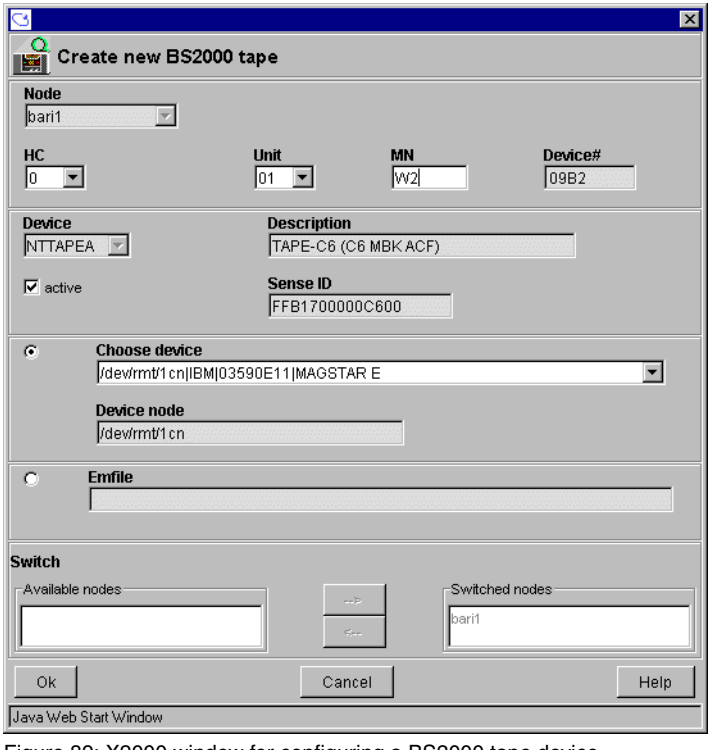


Figure 89: X2000 window for configuring a BS2000 tape device

The same mnemonic name must be entered at each BS2000 system.

After you have performed this step, the configuration contains multiple MTC devices with the same mnemonic name, one device for each BS2000 system in question. In the next step, these devices become a single device which can be seen by multiple BS2000 systems.

2. In the second step, the MTC device must be configured with one of the systems from the first step (*BS2 Tapes* -> *Modify*):

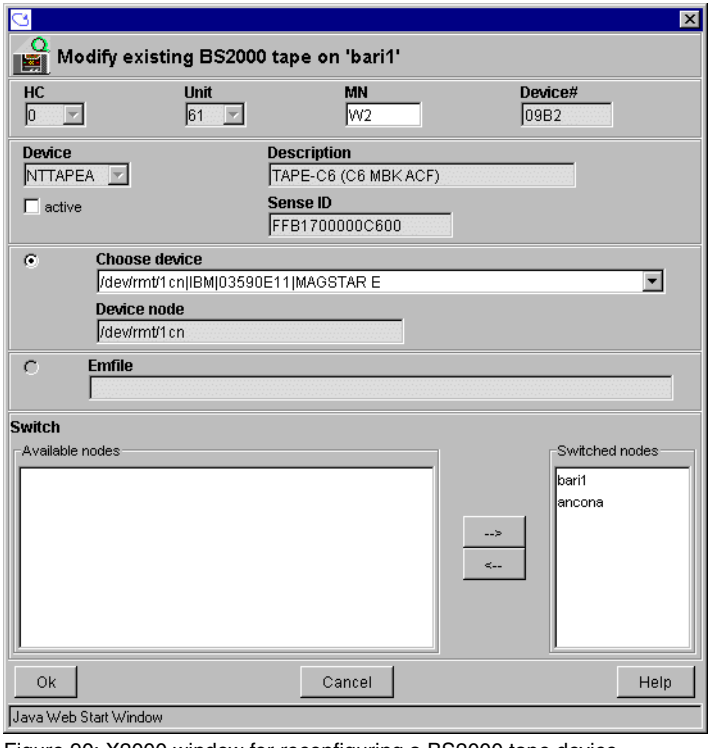


Figure 90: X2000 window for reconfiguring a BS2000 tape device

The *Switch* area of the window contains the following boxes:

- The *Switched nodes* box lists those BS2000 systems which see the MTC device as a shared device
- The *Available nodes* box lists those BS2000 systems which see the MTC device as a single device (Caution: The display in this field is limited by the marking in the left section of the PRIMEPOWER ServerView main display; see the note on page 236).

You can use the [-->] and [<--] buttons to assemble the contents of the node list. These buttons allow you to move selected nodes from one box to the other.

Click the button *Ok* to complete and close the configuration of the MTC device. From this point onwards, the PRIMEPOWER ServerView of all the BS2000 systems which share the device will display the same list in the *Switched nodes* box.

Notes

– You are recommended to configure devices before the BS2000 involved are started. If a device is configured while a BS2000 system is in operation, an ATTACH-DEVICE takes place automatically in this syxstem after the first step. This must be undone with a manual DETACH-DEVICE as the second step cannot be performed while the device is in the ATTACHED state.

– When performing the second step, you are recommended to highlight the root of the tree hierarchy in the left-hand part of the PRIMEPOWER ServerView main display since the *Available nodes* box only lists PRIMEPOWER ServerView nodes that are located in this highlighted area.

– For a BS2000 system not listed in the *Switched nodes* box, the MTC device retains its isolated state. In X2000 there is no coordination between the accesses of this system and the accesses of the systems listed in the *Switched nodes* box. The MTC device may thus only be used when the second step has been completed for all systems which can access the MTC device.

9.4.3 Adding a BS2000 system after initial configuration

The MTC device may not be used between the physical connection of the new system and completion of configuration.

If you subsequently want to connect an additional BS2000 system in the SAN to the MTC device then you must repeat the two steps described on page 234 in PRIMEPOWER ServerView for the new system.

1. Configure the MTC device as a BS2000 device for the new system using the existing mnemonic name.
2. Next, continue the configuration with one of the old systems so that you can add the new system to the list shown in the *Switched nodes* box.

9.4.4 Removing a BS2000 system after initial configuration

The MTC device may not be used during configuration and until the system involved has been detached.
If the host bus adapter to which the MTC is connected is removed from the partition of the BS2000 system using Dynamic Reconfiguration, PCI HotPlug or a reboot, the BS2000 system can remain in the *Switched nodes* list (see the `HBA removed` state on page 241).

If you want to detach a BS2000 system in the SAN from the MTC device, go to the PRIMEPOWER ServerView for the system concerned, delete the device and remove the system from the list in the *Switched nodes* box. The procedure at this point depends on whether the X2000 of the BS2000 system is still running and communicating with the other BS2000 systems or not.

- Case A: X2000 running and communicating

  In PRIMEPOWER ServerView, the MTC device for the BS2000 device concerned is deleted. This removes the BS2000 system from the list in the *Switched nodes* box. The removed system must be detached from the MTC device. The MTC device may not be accessed by this system.

- Case B: X2000 not running

  In PRIMEPOWER ServerView, remove the BS2000 system from the *Switched nodes* box by using one of the remaining BS2000 systems. Under normal circumstances modifying the configuration in this way is only possible when the system is communicating with all the other BS2000 systems on the list in the *Switched nodes* box on the X2000 level.

  The procedure is therefore as follows:

  1. Execute the EVENT command `sx.bs2mtcfetch -f tape-MN` at one of the remaining BS2000 systems (see section “Occupying an MTC device when X2000 communication is disrupted” below).
  2. In PRIMEPOWER ServerView, use this BS2000 system to change the configuration for the MTC device.
  3. Update the list in the *Switched nodes* box and click *Ok*. A prompt is displayed asking if you want to restrict the update of the node list to the accessible local copies. You must respond *Ok* to this prompt.

  In PRIMEPOWER ServerView, the new *Switched nodes* list is displayed for each of the remaining BS2000 systems.

  i If you want to reactivate a BS2000 system which - as described in case B - has been removed from the *Switched nodes* list, you must delete the MTC device concerned for this BS2000 system in the PRIMEPOWER ServerView. You can then reconfigure the system as required and then add the BS2000 system to the other BS2000 systems using the procedure described above. The MTC device may not be used if it can be accessed again by the system concerned and configuration has not been completed.

9.4.5 Occupying an MTC device when X2000 communication is disrupted

In normal circumstances an MTC device can only be occupied by a BS2000 system for use when the BS2000 systems in the *Switched nodes* list can communicate with each other on the X2000 level.

The EVENT command described below (see also section “MTC devices” on page 193) can be used to occupy an MTC device even when communication with one or more of the BS2000 systems is disrupted. It should be used only if you are certain that none of the inaccessible BS2000 systems can access the MTC device.

The EVENT command is as follows:

```
sx.bs2mtcfetch -f tape-MN
```

`-f` Force option. When the command has been executed, the MTC device for the current BS2000 system can be occupied even though some of the systems in the *Switched nodes* list might not be accessible.

The option becomes unavailable after a period of 3 to 6 minutes.

`tape-MN` Mnemonic name of the BS2000 device.

This command is especially useful when you need to remove a failed BS2000 system from the *Switched nodes* list (see section “Removing a BS2000 system after initial configuration” on page 237).

To include a system which was not accessible when the `bs2mtcfetch -f` command was issued in use of the MTC device again, proceed as follows:

1. Terminate use of the MTC device.
2. Reconnect the system to the MTC device.
3. Perform a DETACH and ATTACH for the device on the system.
4. Resume using the MTC device.

The command `bs2mtcfetch -f` can also be used as a replacement for the BS2000 command `UNLOCK-DEVICE` which is not otherwise available for X2000 MTC devices (which in BS2000 is terminated with the message text `COMMAND REJECT`).

9.4.6 Displaying the occupancy status of an MTC device

The following EVENT command (see also section “MTC devices” on page 193) displays the occupancy status of an MTC device for the BS2000 systems on the *Switched nodes* list:

```
sx.bs2mtcfetch -l tape-MN
```

`-l` List option. The status information listed below is displayed.

`tape-MN` Mnemonic name of the BS2000 device.

Extra information:

A single line for each BS2000 system on the *Switched nodes* list line is output under the following header:

```
HOST            STATE    DAEMON  SEMA    F XHH_UU MN DEVTYPE PATH
```

`HOST` Name of the BS2000 system

`STATE` The possible entries here are:

- `fetched` Device can be used
- `released` Device is released for other systems

`DAEMON` ID of the daemon process

`SEMA` ID of a process which initiated the task of occupying the device for the BS2000 system

`F` A value > 0 indicates that the “Force” option is active.

`X` X2000-internal characteristic

`HH` Host connector number of the BS2000 device

`UU` Unit number of the BS2000 device

`MN` Mnemonic name of the BS2000 device.

`DEVTYPE` X2000 type class of the device

`PATH` X2000 path of the device

The following abnormal statuses are also reported:

- `disconnected or permission denied`
  It is not possible to communicate with the BS200 system on the X2000 level.
  Possible causes:
  – X2000 is not able to respond within a set time period.
  – The network connection to the host is defective.
  – Authorization to administer the system via the PRIMEPOWER ServerView Domain Service cannot be verified.
  Action:
  Rectify the problem. If required, beforehand remove the BS2000 system from the *Switched nodes* list, trace and remove the fault and then add the system to the list again.

- `device not configured`
  There is no MTC device `tape-mn` for the BS2000 system.
  Result:
  The BS2000 system is ignored in the *Switched nodes* list.

- `daemon stopped`
  There is no daemon process running in X2000 of the BS2000 system.
  Result:
  During subsequent operation, a new daemon process is automatically started where required.

- `device not accessible`
  The X2000 path does not point to a valid device node.
  Possible cause:
  The physical device connection was changed after creation of the BS2000 device.
  Action:
  Rectify the problem. If required, beforehand remove the BS2000 system from the *Switched nodes* list, trace and remove the fault and then add the system to the list again.

– `HBA removed`
  The X2000 path does not represent a valid device node.
  Possible cause:
  The host bus adapter to which the MTC device is connected was removed from the system's partition.
  Result:
  The BS2000 system is ignored in the *Switched nodes* list.

9.5 Configuring printers

9.5.1 Configuring Xprint printers

You configure Xprint printers in the Mercator graphical user interface.

You can operate Mercator:
– via the hardware console (SMC) of the SX server
– via a PC with an X user interface

For information on installing and operating the Mercator graphical user interface, see the manual “Xprint Management V6.0A GUI” [22].

Xprint is a licensed product. The commands for entering valid licenses are described in the manual “Xprint Management V6.0A GUI” [22].

9.5.1.1 Starting Mercator

► Permit SX access to the computer from which you are performing the operation.

Example

Configuration of the X server at the PC:
with Exceed: Settings under *Security*, see page 137
for SKP-SR: `xhost + <hostname>`

In order to perform printer configuration under Mercator, you must be able to access the partition with root permissions. This is possible via root access at the SMC consoles (with RC2000) or by means of user-specific logins which acquire root permissions via the `su` command after login (see section “Login access to root in the partitions” on page 17).

► Establish access to the partition with root permissions.

► Enter the name of the computer from which you are performing the operation via the DISPLAY variable and call Mercator.

```
DISPLAY=<hostname of computer>:0 mercator &
```

You now see the welcome screen:

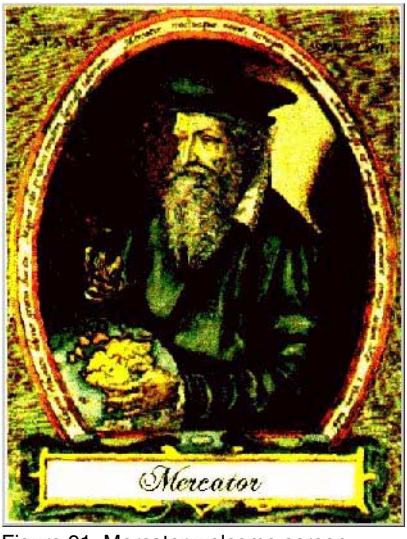


Figure 91: Mercator welcome screen

After a few seconds the first selection screen for configuration and administration is displayed.

You can only perform administrative activities with Mercator if Xprint is running. If it is not, a message at the bottom of the first selection screen informs you that Xprint is not available.
Remedy:
Start Xprint with the command `xpstart`. You should then refresh the Mercator screen (*View* -> *Refresh*).

9.5.1.2 Configuring a new printer

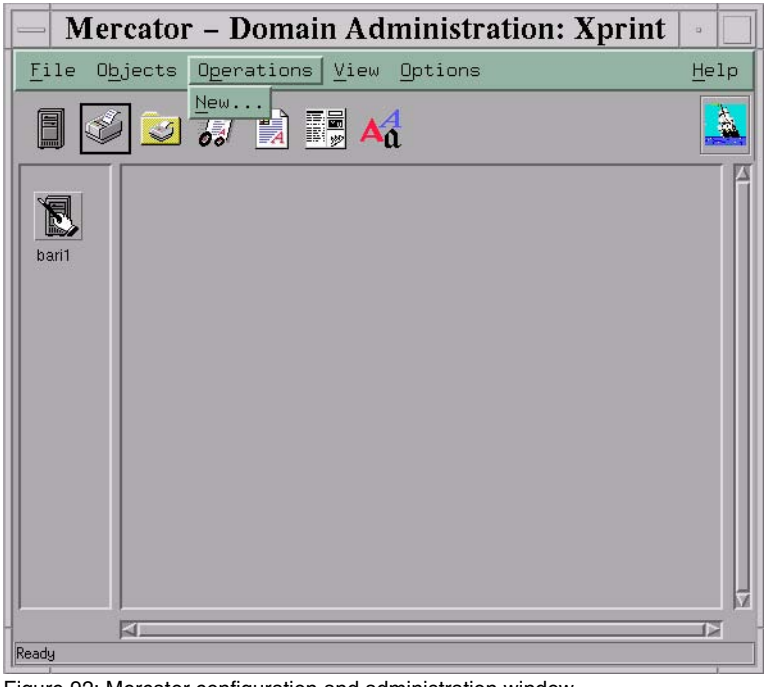


Figure 92: Mercator configuration and administration window

► Left-click on the printer icon.

► Choose *Operations* -> *New*.

A screen (*Basic*) in which you can configure a new printer is now displayed:

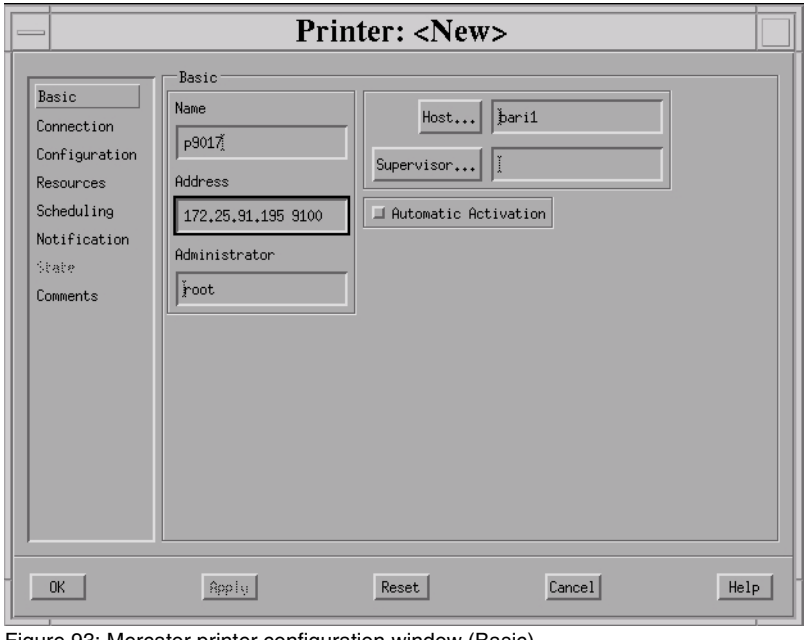


Figure 93: Mercator printer configuration window (Basic)

► Enter the following:
- Printer name
- IP address
- Port number

► Click *Connection*. Choose *LAN* as the connection type

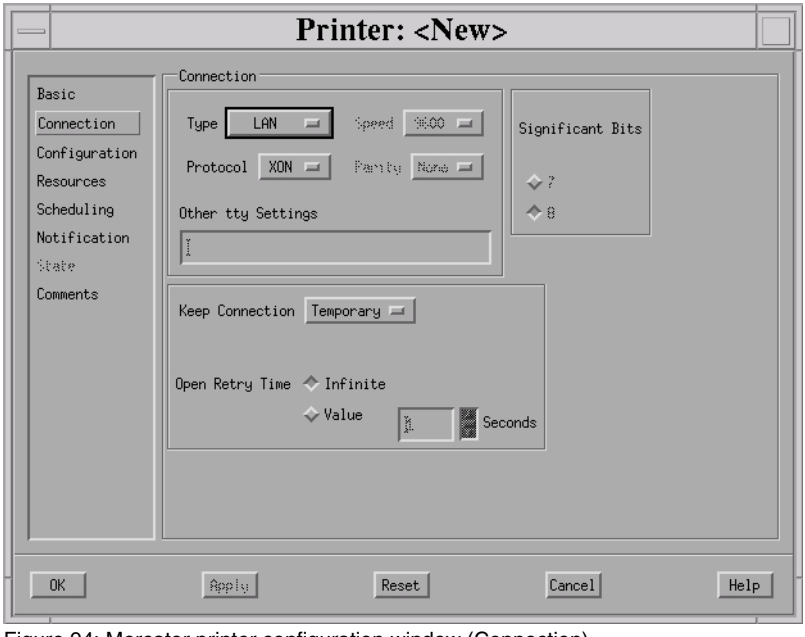


Figure 94: Mercator printer configuration window (Connection)

► Click *Configuration*. You can define the required printer type via the *PCL* definition:

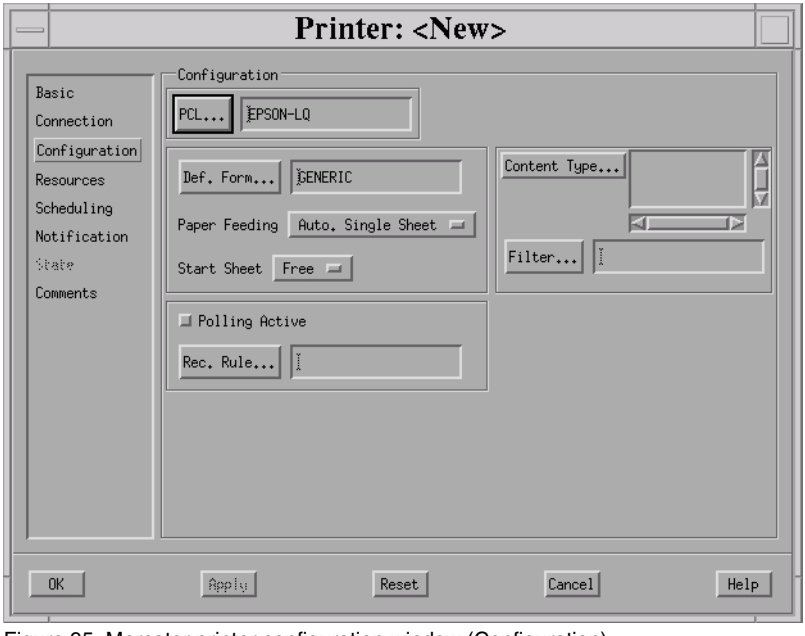


Figure 95: Mercator printer configuration window (Configuration)

The table below indicates the printer type, emulation and PCL which can also be used as BS2000 spool printers or emulated TRANSDATA printers (see section “Configuring a BS2000 printer” on page 252).

Printer model	Emulation	PCL
9014	ECMA	E-9014
9015	ECMA	E-9015
9017	EPSON-LQ	EPSON-LQ
4830	PCL5e	PJL-PCL5e-48xx
4850	PCL5e	PJL-PCL5e-4850
9045	ANSI	A-ZD14

When you click the *OK* button, the settings are taken over into the Xprint database and the printer is displayed in graphical form in the first selection screen. In this screen, the printer icon is blurred and displayed with a broken connection since the printer is not yet active:

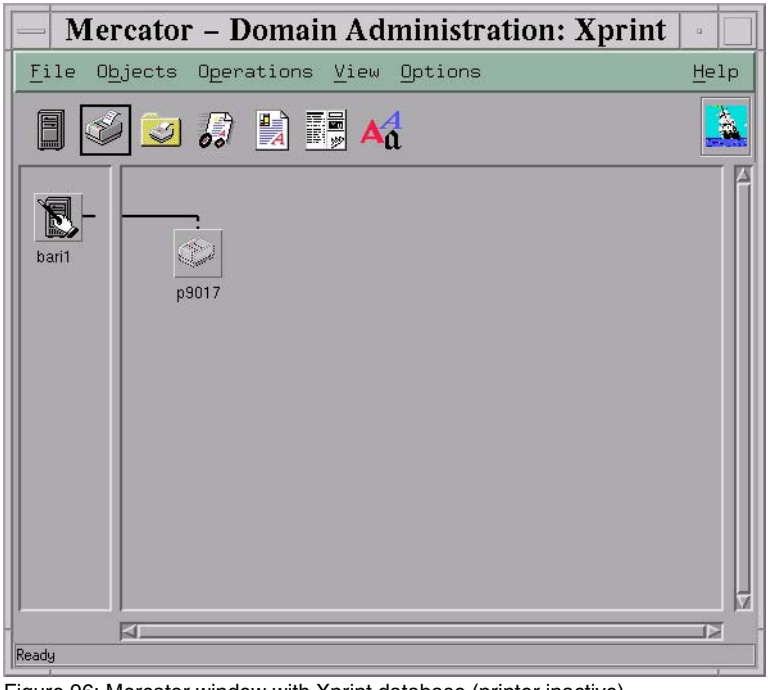


Figure 96: Mercator window with Xprint database (printer inactive)

The display of the new printer is delayed for approximately ½ minute if the LAN connection to the printer is disrupted (e.g. if the printer is switched off).

► Double-click the icon corresponding to the new printer.

This re-opens the configuration screen (*State*) in which you can set the printer to active. You can also make changes to the configuration.

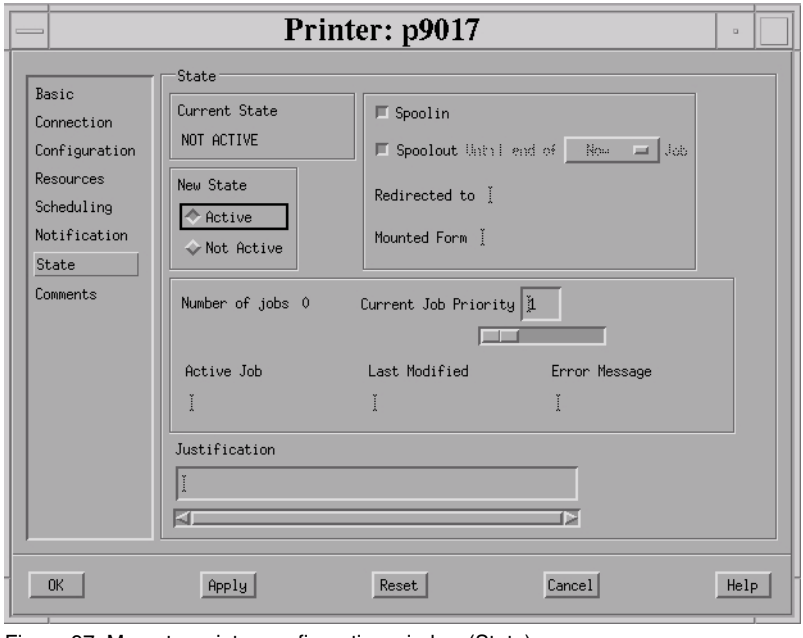


Figure 97: Mercator printer configuration window (State)

After this, the printer icon is sharp and the line representing the connection is no longer broken:

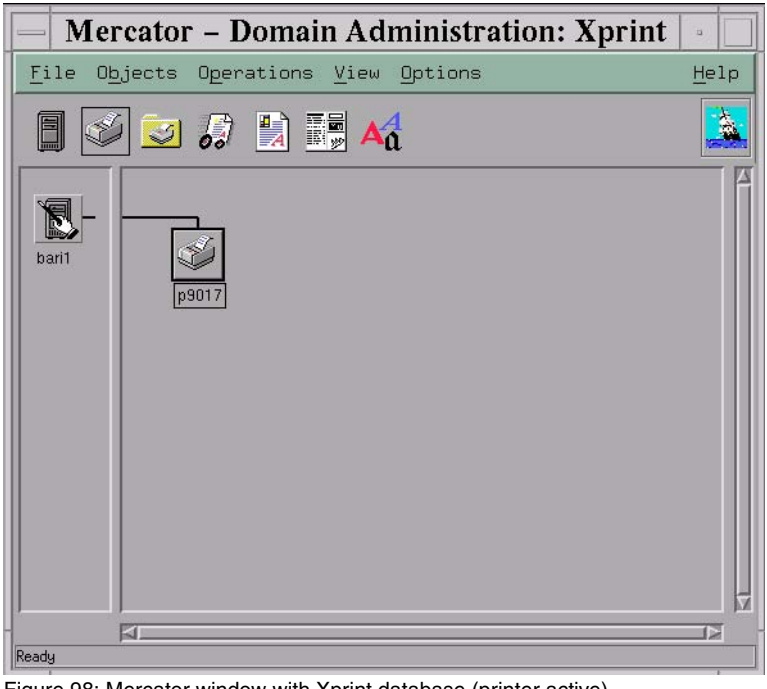


Figure 98: Mercator window with Xprint database (printer active)

9.5.2 Configuring the SEH Printserver

In SX systems, printers are connected via an adapter produced by the company SEH, the so-called SEH Printserver. This print server may take the form of a separate adapter box (e.g. a pocket adapter with type name IC105) or an integrated LAN card (e.g. in the case of the 9017 printer).

To configure the print server, you must assign the IP address or host name to the hardware address (MAC address):

- Log in under root to a UNIX computer which is located in the same subnetwork as the SEH Printserver.
- Enter the following command:

```
arp -s <IP-address> <hardware-address>
    or
arp -s <hostname>[1]   <hardware-address>
```

Example

```
arp -s 139.22.8.150   0:c0:eb:0:3:15
```

You can check the connection with `ping <IP-address>` or `ping <hostname>`. If the connection is intact, the following response message is output:

```
<IP-address> is alive
```

[1] There must be an entry for the <IP-address> and <hostname> assignment in the file /etc/hosts!

9.5.3 Configuring a BS2000 printer

You can create, modify or delete emulated BS2000 printers via the X2000 graphical user interface under PRIMEPOWER ServerView. You choose *BS2 Printers* -> *Create* to generate a new BS2000 printer (local spool printer) or an emulated TRANSDATA printer which can be used via RSO:

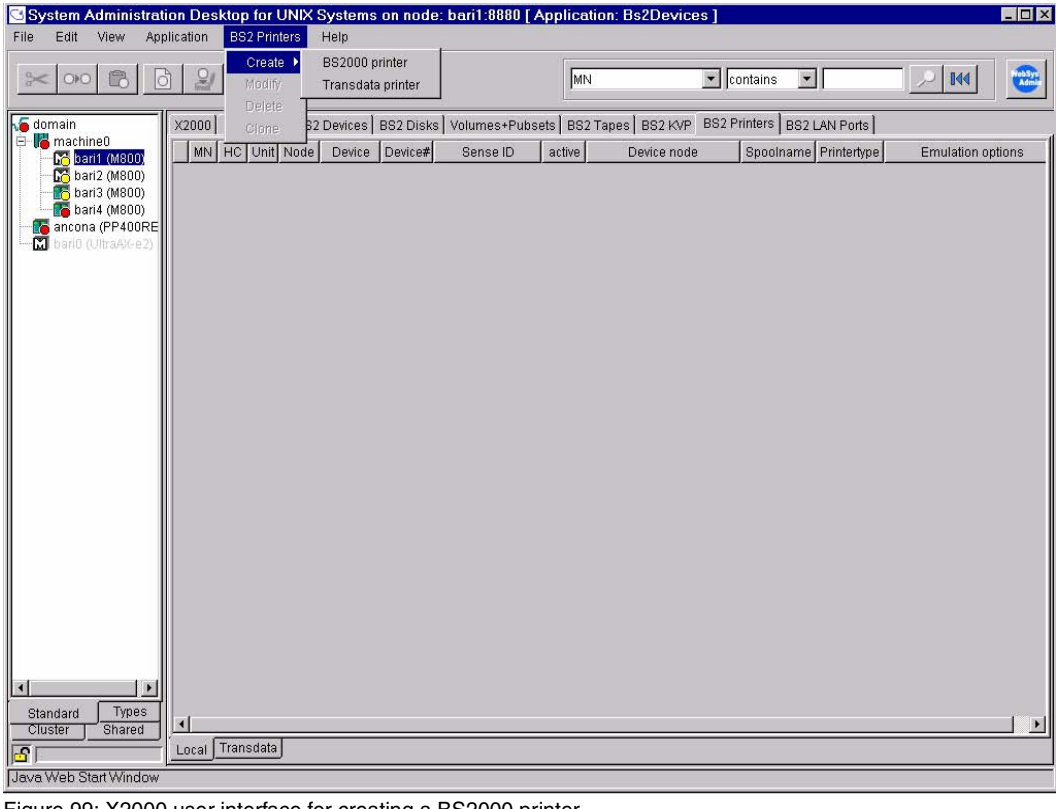


Figure 99: X2000 user interface for creating a BS2000 printer

When you select *BS2000 printer*, the *Create a new BS2000 printer* window opens:

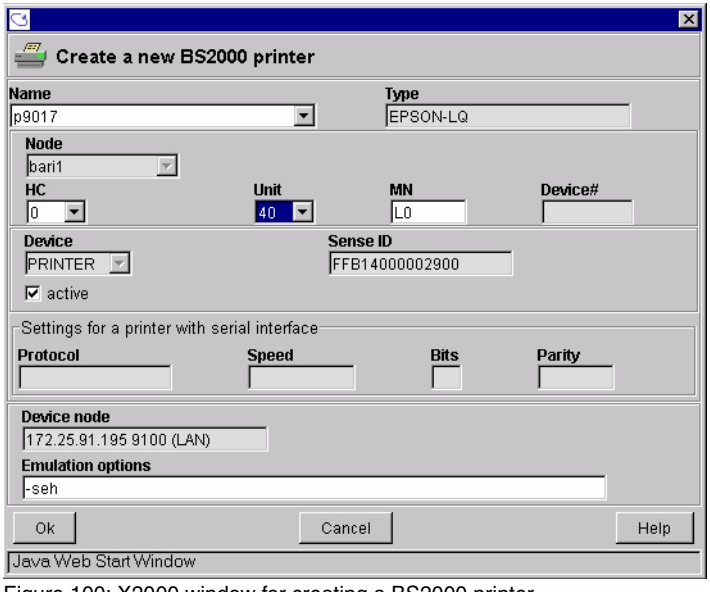


Figure 100: X2000 window for creating a BS2000 printer

Node	Computer node on which the BS2000 printer is to be set up.
Name	Here, you specify the name of a printer which is configured in the UNIX system and which is to be used for print output by the emulation.
Type	The system displays the printer type corresponding to the printer entered under “Name”.
HC 0-F	The host connector and unit represent the unique device name at the computer.
Unit 00 - FF	The unit numbers that are as yet unassigned are presented in the selection box.
MN	The mnemonic name represents the unique two-character device name at the computer. Both digits and letters are permitted.
Device#	The system generates the device number from the mnemonic name chosen by the user.
Device PRINTER	This entry is preset for printers.
Sense ID	The device-dependent identification code is generated internally and displayed here.

active	If you check this box then the emulation is activated immediately. If not, the device is simply declared to the BS2000 system.
	An entry is made in the SERSFILE (every minute) if the device is attached in the BS2000 system but not activated.
Communication settings	*Only for serial device connections (not relevant for SX servers).*
Device node	The system displays the IP address and the port number via which the printer is accessed.
Emulation options	Here you can specify options, for example for diagnostic purposes. If you specify multiple options then you must separate them using spaces.

In the above example, the UNIX printer `p9017` is assigned as a physical device to the local BS2000 spool printer with the mnemonic name `LO` at host connector/unit address `0/40` at the computer `bari`. `-seh` is specified in the *Emulation options*. This tells the printer emulation to communicate with the printer via the so-called RSO spool protocol and to use port number 2900 (print security!).

Further emulation options are described in section “Emulation options for controlling the X2000 printer emulation” on page 260 of this manual and in the online help system.

If you select *Transdata printer*, the *Create a new Transdata printer* window opens:

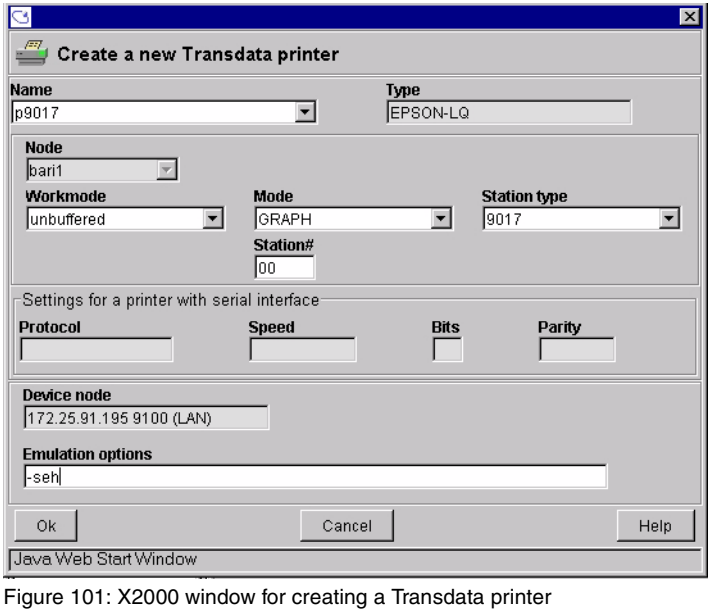


Figure 101: X2000 window for creating a Transdata printer

Node	Computer node on which the Transdata printer is to be set up.
Name	Here, you specify the name of a printer which is configured in the UNIX system and which is to be used for print output by the emulation.
Type	The system displays the printer type corresponding to the printer entered under “Name”.
Workmode	`buffered`: The print job is to be performed via the UNIX spool. `unbuffered`: The print job is to explicitly occupy the UNIX printer.
Mode	`CHAR`: The emulation converts the character codes and control sequences. `GRAPH`: The emulation runs without performing a conversion.
Station type	You can choose between the actual printer type (e.g. 9014) or the universal station type 8122.
Station# 0-127	The station name is formed internally from the station type and the entered “Station#” (e.g. E9014#00 / E8122#7F). The station name must be specified in order to define a remote printer in the `ADD_SPOOL_DEV` function of the SPSERVE utility.
Communication settings	*Only for serial device connections (not relevant for the SX servers).*
Device node	The system displays the IP address and the port number via which the printer is accessed.
Emulation options	Here you can specify options, for example for diagnostic purposes. If you specify multiple options then you must separate them using spaces. The following options are available for print stations in unbuffered mode: -seh This switch must be set if the emulation operates a printer which is connected via LAN and SEH Printserver. -trace The emulation's trace function is activated. In the case of print stations in buffered mode, it is possible to control the trace options of the participating EMDS emulation (switches -P 1/2/3, -D, -E and -L).

In the example below, a print station with the name `E9017#00`, operated in unbuffered mode without character conversion, is set up on the computer `bari1`. The UNIX printer `p9017` is used as the physical device. `-seh` is specified in the *Emulation options*. This tells the printer emulation to communicate with the printer via the so-called RSO spool protocol and to use port number 2900 (print security!).

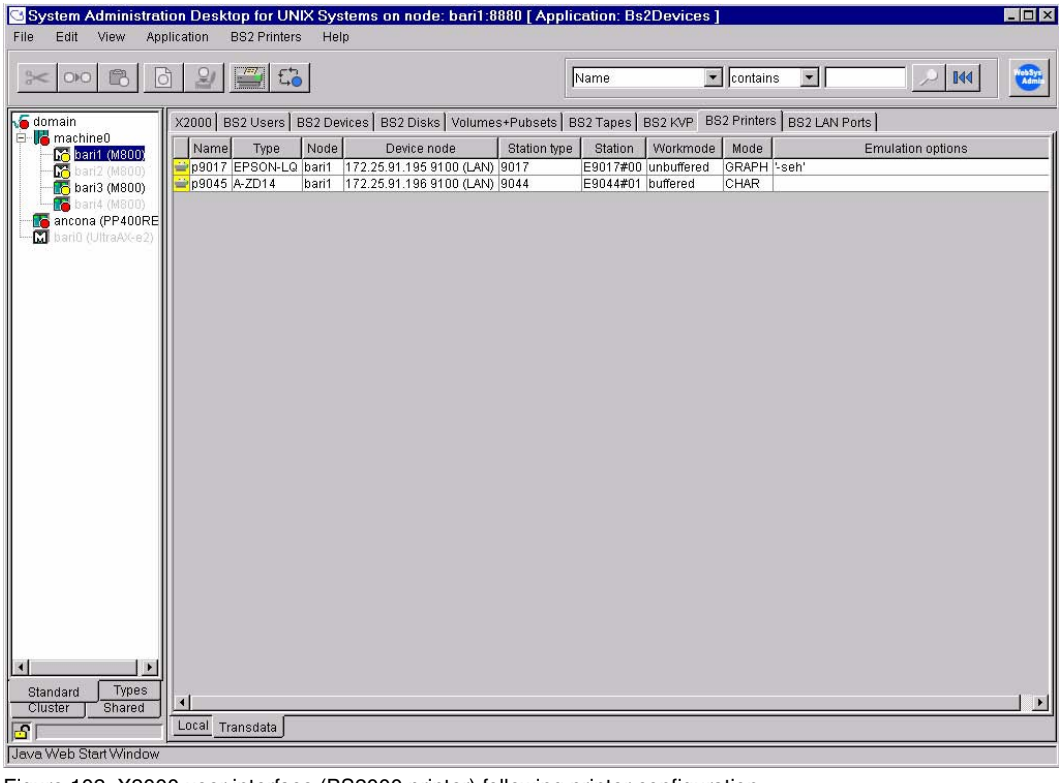

System Administration Desktop for UNIX Systems on node: bari1:8880 [Application: Bs2Devices]
File Edit View Application BS2 Printers Help
Name contains
domain
machine0
bari1 (M800)
bari2 (M800)
bari3 (M800)
bari4 (M800)
ancona (PP400RE
bari0 (UltraAX-e2)
X2000 BS2 Users BS2 Devices BS2 Disks Volumes+Pubsets BS2 Tapes BS2 KVP BS2 Printers BS2 LAN Ports
Name Type Node Device node Station type Station Workmode Mode Emulation options
p9017 EPSON-LQ bari1 172.25.91.195 9100 (LAN) 9017 E9017#00 unbuffered GRAPH '-seh'
p9045 A-ZD14 bari1 172.25.91.196 9100 (LAN) 9044 E9044#01 buffered CHAR
Standard Types
Cluster Shared
Local Transdata
Java Web Start Window

Figure 102: X2000 user interface (BS2000 printer) following printer configuration

The configured Transdata printers can be displayed by selecting the *Transdata* subtab at the bottom left. Select the *Local* subtab if you want to display the local BS2000 spool printers.

9.5.4 Starting up an emulated BS2000 printer

1. Define the BS2000 printer using the SPSERVE administration program and specify the parameter values (ADD-SPOOL-DEVICE function)

   Example for printer type LP-EMUL

   ```
   DEVICE-NAME=P1

   DEVICE-TYPE=lp-emulated-printer

   DEVICE-ACCESS=local-access(
       ACCESS-TYPE=bus-type-1
       MNEMONIC-NAME=P1)
   ```

   Example for printer type xxx-REMOTE-PRINTER

   ```
   DEVICE-NAME=DRV001          (user-definable name)
   DEVICE-TYPE=*9014-REMOTE-PRINTER
   DEVICE-ACCESS=*NEA-ACCESS(
       ACCESS-TYPE=*PC
       PROCESSOR-NAME=LOCSIN
       STATION-NAME=E9014#08
       :
       :
   MODULO2=NO                  (necessary for emulated TRANSDATA printers)
   ```

2. Determine a LAN address.

   On SX systems, printers are operated only via LAN and LAN adapters (SEH Printserver). You must therefore use the network administration functions to query the IP address via which the LAN adapter can be addressed. This address, together with a port number, is required when you configure the UNIX printer. In the case of SEH Printservers, you should use the port numbers 9100 (in the case of pocket adapters) or 910x (in the case of an adapter box with a multiple connection, x=0,1, ...) depending on the type in question.

3. Configure a UNIX printer

   Configuration of a UNIX printer using the Mercator graphical tool is described in section “Configuring Xprint printers” on page 242.

4. Configure the BS2000 device in the X2000 system

   Configuration of a UNIX printer as a BS2000 printer (type: LP-EMUL) is described in section “Configuring a new printer” on page 244. This assigns the BS2000 printer with, for example, the mnemonic name L0 to a UNIX printer, for example p9017.

9.5.5 Using printer-specific functions with the BS2000 printer type LP-EMUL

The BS2000 printer type LP-EMUL can be used to operate a number of different physical printer types (needle, ink jet, band and laser printers).

In order to use the special characteristics of the connected printer, it is necessary to send not only the print data itself but also the control characters (or control character sequences) designed for precisely this printer type. These are the so-called Escape sequences. The printer emulation in X2000 systems makes this possible in the following ways:

- Unlike the so-called normal mode in which all non-printing characters are converted into spaces, transparent mode can be used to transfer control characters present in the print data to the printer. Transparent mode is activated by means of a PREFORM record (see below).
- You can use the PRM utility (Print Resource Management, see the PRM manual [20]) to define a PREFORM record which can then be assigned to a form. The content of the PREFORM record is evaluated at the start of the print job and any resulting control characters are sent to the printer. The PREFORM record contains physical or logical Escape sequences.

  The advantage of logical Escape sequences is that they can be used independently of the connected printer type.

Defining physical and logical Escape sequences in the PREFORM record

There are no formal rules governing physical Escape sequences since these are printer-specific character sequences which must be correct for the employed printer type in order to achieve the desired print result.

A logical Escape sequence has the following format:

```
\E\E<command>[,<command>]...[,<comment>]...;
```

The specification `\E\E` is the ID for logical Escape sequences. The specification is not case-sensitive. Any spaces between the individual commands are skipped.

Comments start with the hash character (#) and continue until the next comma or semi-colon. The Escape sequence is evaluated until a semi-colon is reached. If a given function is not available at the printer in question then the corresponding Escape sequence is ignored.

The following commands are defined:

DRAFT Sets draft mode

LQ Sets letter quality

PORTRAIT Sets portrait format

LANDSCAPE Sets landscape format

CPI=nn Sets the character width:
nn = 10, 12, 15 or 17 CPI = characters per inch

LAN=cs Sets a country-specific character set in the printer. Possible values for cs are:

In	Standard international	Es	Spanish
As	Standard ASCII	Ni	Dutch
De	German	No	Norwegian
En	English	Sv	Swedish
Da	Danish	Fi	Finnish
Fr	French	Cy	Cyrillic
It	Italian		

TRANS Activates transparent mode and counts lines/page.

TRANS1 Activates transparent mode without counting lines, e.g. for RENO applications.

OP=n Operating mode for printers equipped with cutters:

OP	Tractor (4850)	Paper shelf		Cut
		9015	4850	
1	Buttom	Stack	Stack	No
2	Buttom	Stack	Stack	Yes
3	Buttom	Form	Stack	No
4	Buttom	Form	Form	Yes
5	Top		Stack	No
6	Top		Stack	Yes
7	Top		Stack	No
8	Top		Form	Yes

Table 11: Operating mode for printers equipped with cutters

9.5.6 Emulation options for controlling the X2000 printer emulation

You can use the emulation options to enable certain functions in the printer emulation. Some of these are required for diagnostic purposes whereas others may be useful or necessary for operation.

`-seh` This switch must be set if the emulation operates a printer which is connected via LAN and SEH Printserver.

`-trace=n` The emulation's trace function is activated (n = 1/2) or deactivated (`n = 0`).
`n=2` activates the permanent trace function. It should remain active for only a small number of print jobs as otherwise the trace file can grow unrestrictedly and the status `file system full` may be reached (exception: additional option `-opt=x10`, see below).
`n=1` activates the event-driven trace in which a maximum of 8 KB of trace information is written to the trace file if an error occurs. This information records the most recent actions performed by the emulation prior to recognition of the error state.

`-opt=ooo` This is used to set one or more option switches which are generally used only for development purposes.
The option switch `-opt=x10` is of relevance in combination with `-trace=2`: This restricts the size of the trace file to approximately 1 MB. If this limit is exceeded, the trace file is copied to a file with the suffix `.sv` and a new trace file is created.

The seven settings below which affect the printed result can also be activated via a BS2000 spool form with a corresponding PREFORM record. The setting then only applies to print jobs with this form.

`-trans` If this option is set then the emulation performs every print job in transparent mode, i.e. control characters within the print data are also transferred (in normal mode, non-printing characters and characters with a code > x'7F' are converted into spaces).

Transparent mode has to be used in order to print the eurocurrency symbol on printers with the character set ISO 8859-15 (Latin-9)!

`-cpi=nn` This option sets the character width for each print job to `nn` characters per inch (`nn = 10/12/15/17`).

`-lq` Print output at the printer is performed in letter quality mode (LQ).

`-draft` Print output at the printer is performed in draft quality mode (DRAFT).

`-port` The print data is prepared for vertical forms (PORTRAIT).

`-ldsc` The print data is prepared for horizontal forms (LANDSCAPE).

`-lan=cs` A country-specific character set is selected in the printer.

Possible values for `cs` are:

In	Standard international
As	Standard Ascii
De	German
En	English
Da	Danish
Fr	French
It	Italian
Es	Spanish
Ni	Dutch
No	Norwegian
Sv	Swedish
Fi	Finnish
Cy	Cyrillic

`-spool` The X2000 printer emulation makes it possible to gather the print data for a print job in a file instead of sending it to a physical printer. In addition, a UNIX shell script is started when data transfer is complete. This script defines how the stored print data is to be processed (e.g. sent to a printer available in the UNIX spool).

This function corresponds to the usual printer driver option `Print to file`, i.e. the target file contains all the print data together with all the necessary printer control characters.

Necessary actions when using the option -spool

– Configure an LP-EMUL printer type in BS2000

You can configure the corresponding printer emulation with the emulation option `-spool`. This stores the print data in a file. At the end of the print job, the shell script `/opt/SMAW/X2000/bin/spoolcmd` is started with the file name as the parameter.

You must create the shell script `/opt/SMAW/X2000/bin/spoolcmd` to define the further processing of the print data file.

Example script

```
#Print data from print file via Xprint to the printer
# hpljlan
# Print command xpadd with parameter -cp (Xprint creates
# copy of file)
xpadd -dr $1 -de hpljlan -cp

# Delete print data file
rm $1
```

If multiple emulated printers are configured and these are to output their data at different physical printers then the script can be extended as follows:

```
# Determine mnemonic name from file name
# (e.g. /var/opt/SMAW/X2000/tmp/EPRINTER_L0.9021)
MN=`echo $1 | cut -f2 -d'_' | cut -c1-2`

# Print data from file to the corresponding printer as per
# mnemonic name
if [ $MN = L0 ]
then
xpadd -dr $1 -de hpljlan0 -cp
fi
if [ $MN = L1 ]
then
xpadd -dr $1 -de hpljlan1 -cp
fi
if [ $MN = L2 ]
then
xpadd -dr $1 -de hpljlan2 -cp
fi
# Delete print data file
rm $1
```

– Check the status of Xprint and the printer

Naturally, when print output is performed with the `-spool` option, then BS2000 considers the print job to have been successfully concluded once the print data has been stored in a temporary file (message `SPS0120 - spoolout completed`). It is then no longer possible for BS2 Spool to check the job.

In order to improve this situation, it is now possible to call a script (`/opt/SMAW/X2000/bin/spoolstate.<mn>, <mn> = mnemonic-name`) which checks whether any messages relating to errors or malfunctions are present in Xprint or the employed printer when the first channel command in the print job (`RESERVE-CCW`) is executed. This makes it possible to establish with certainty whether Xprint has been

started and the printer is activated. Printer malfunctions are detected if Xprint itself detects a printer fault or if the number of queued print jobs exceeds a user-defined value.

If a fault is present or is likely due to the excessive queue length then the `RESERVE-CCW` is acknowledged with an `equipment check` error. This results in a spool error message at the BS2 console.

Communication between script and printer emulation is performed via a file (`/var/opt/SMAW/X2000/tmp/spool_busy.<mn>`) which is first deleted by the emulation and then regenerated by the script if a fault is present. If this file is present after execution of the script then the emulation recognizes that an Xprint error situation exists.

Example script `/opt/SMAW/X2000/bin/spoolstate.L0`

The UNIX printer 4826seh is assigned to the BS2 printer L0:

```
# Determine number of print jobs in queue
SPOOLQL='xpstat | grep 4826seh | grep WAIT | wc -l' ;

# Check printer for error state
SPOOLQE='xpstat | grep 4826seh | grep 'D (' | wc -l' ;

# Check whether Xprint and printer are active
SPOOLNA='xpstat -dev 4826seh | grep ON | grep ACTIVE | grep -v NOT' ;

if [ \( $SPOOLQL -gt 5 \) -o \( $SPOOLQE -ge 1 \) ]
then echo SPOOL IS NOT READY > /var/opt/SMAW/X2000/tmp/spool_busy.L0
echo $SPOOLQE job device busy/printer fault  >>
/var/opt/SMAW/X2000/tmp/spool_busy.L0
echo $SPOOLQL jobs waiting >> /var/opt/SMAW/X2000/tmp/spool_busy.L0
elif [ "$SPOOLNA" = "" ]
then echo SPOOL not running or printer not active >
/var/opt/SMAW/X2000/tmp/spool_busy.L0
else exit 0
fi
```

9.6 Local and remote communications

9.6.1 ATNS

The transport system permits both local communications between the BS2000 processor (general processor) and the Solaris processor and network-wide communication via the Solaris processor.

The names of the locally communicating applications are automatically set up via the ATNS functions.

9.6.1.1 Generating the TNS entries

During configuration/installation, ATNS generates the necessary TNS entries for both Solaris and BS2000 standard applications.

- Solaris standard applications

  This point is for information only unless the system administrator explicitly wants to change something.

  The ATNS uses the file `/etc/opt/SMAW/X2000/tnsloc_data` to generate the TNS entries for local Solaris standard applications. If this file is not present, it is generated automatically when ATNS is called (`atns tnsloc_data conf`) and contains the following default values:

$FTAM	$FJAM002	$FJAM005
$FJAM	$FJAM003	$CONSOUT
$FJAM001	$FJAM004	

  The Solaris standard applications are automatically generated on installation. You can process the file `/etc/opt/SMAW/X2000/tnsloc_data` with an editor in order to create further TNS entries. You can then activate these changes by calling the program `atns tnsloc_data conf` (e.g. for em9750 names: DSSnnn).

- BS2000 standard applications

  The ATNS uses the file `/etc/opt/SMAW/X2000/tnsrem_data` to create the TNS entries for local BS2000 standard applications. The call is issued automatically after the successful configuration of a local BS2000 communication device (LAN port).

  If the file `/etc/opt/SMAW/X2000/tnsrem_data` is not present, it is generated automatically when ATNS is called and contains the following default values:

$AC	$FJAM005	A08BS2
$CONSOLE	A01BS2	A96BS2
$DIALOG	A02BS2	A97BS2
$VMCONS	A03BS2	A98BS2
$FJAM001	A04BS2	A99BS2
$FJAM002	A05BS2	PRSC
$FJAM003	A06BS2	OMNIS
$FJAM004	A07BS2	

  This automatically creates the following TNS entries:
  `<BS2000-node-name> <application>` (e.g. LBS20$DIALOG)

  You can process the file `tnsrem_data` in an editor. To activate the changes that you make, you must deconfigure and then reconfigure the BS2000 communication device in question via PRIMEPOWER ServerView.

  i Deconfiguring or configuring result in the termination of all connections via this port.

  The following command does the same thing in one go (without any effect on active connections):

```
atns <channel> <unit> conf
```

  Here `<channel>` is the channel number and `<unit>` is the lower unit number of the BS2000 communication device pair.

  Notes on deconfiguration

  – You can only delete those application names, which are contained in the file `tnsrem_data` at the time of deconfiguration.

  – If application names are deleted after the configuration of a LOCLAN device emulation, the deleted application names remain listed in TNS and can then be purged by means of the command `tnsxdel` or the menu *CMXCUI*.

9.6.1.2 Example of setting up a connection

- After system installation:

  Connections from the local X2000 system to all the BS2000 standard applications can be established via the preconfigured BS2000 communication devices.

  – LAN port (LOCLAN)

    `LBS20$DIALOG` must be entered as the connection partner in the EMDS.
    Example: `Name [(5) Personal Name] LBS20$DIALOG`

- During live operation:

  The required BS2000 communication devices must be configured and the corresponding /BCIN commands issued. It is then possible to establish connections.

  – LAN port (LOCLAN):

    A connection partner must be entered in the EMDS.
    Example: `Name [(5) Personal Name] LBS23$DIALOG`

    LBS23 is the BS2000 node name of the LOCLAN port. The standard BS2000 node name can be changed as required (e.g. from `LBS23` to `VM4`).

9.6.2 Using the LAN connections

There are two ways of configuring LAN connections via X2000 in BS2000:

– LOCLAN
– ZASLAN

9.6.2.1 LOCLAN

LOCLAN makes it possible to use connections between the local X2000 and local BS2000 systems via TCP/IP.

If you are working on the local BS2000 system with VM2000, you should operate all the connections between the guest and daemon systems via LOCLAN since the packet size of a LOCLAN device can have a value of up to 64 KB. In theory, the connection between the guest and daemon systems can also be established via a ZASLAN device. However, in this case the packet size is limited by the CSMA-CD process (Ethernet: 1500 bytes; Jumbo Frames: 9000 bytes).

All the connection paths must be configured in the BS2000 system, for example using /BCIN commands.

CSMA-CD protocols are used. A LOCLAN device can transfer frame sizes of up to 64 KB.

All LOCLAN connections at the X2000 use the interface SMAWLnet0.
The default IP address 192.168.138.12 is assigned to this interface. Any change to the IP address for the interface SMAWLnet0 consequently affects all LOCLAN connections.

If you want to use frame sizes above the standard CSMA-CD size of 1500 bytes then you must configure BCAM accordingly:

```
/BCOPT DEV-LPDU-SIZE-USAGE=*ON

/CREATE-LINE ........

/BCACT ...

/BCOPT DEV-LPDU-SIZE-USAGE=*OFF
```

It must be remembered that all lines with maximum frame sizes activated in the phase `DEV-LPDU-SIZE-USAGE=*ON` must be operated.

For BCAM V17.0 and higher, direct indication is possible when setting up the line:

```
/CREATE-LINE LINE-NAME=LOCLAN,L2-PROTOCOL=*CSMACD(NODE-NAME=LOCLAN, -
/            WRITE-DEVICE=Y0,READ-DEVICE=Y1,MAX-LPDU-SIZE=*BY-DEVICE)
/ACTIVATE-LINE LINE-NAME=LOCLAN
```

Example

The following BS2000 commands establish a connection between the daemon and the guest systems.

```
/CREATE-NODE NODE-NAME=LOCLAN
/CREATE-LINE LINE-NAME=LOCLAN,L2-PROTOCOL=*CSMACD(WRITE-DEVICE=..., -
/   READ-DEVICE=...,MAX-LPDU-SIZE=*BY-DEVICE,...)
/ACTIVATE-LINE LINE-NAME=...
/CREATE-PROCESSOR PROCESSOR-NAME=LOCSIN
/CREATE-ROUTE ROUTE-NAME=LOCSIN,PROCESSOR-NAME=LOCSIN,-
/   PATH=*NODE(NODE-NAME=LOCLAN,LINE-NAME=LOCLAN,-
/   L3-PROT=*IP(L4-PROTOCOL=*TCP,IP-ADDRESS=192.168.138.012))
/CREATE-PROCESSOR PROCESSOR-NAME=GAST1
/CREATE-ROUTE ROUTE-NAME=GAST1,PROCESSOR-NAME=GAST1,-
/   PATH=*NODE(NODE-NAME=LOCLAN,LINE-NAME=LOCLAN,-
/   L3-PROT=*IP(L4-PROTOCOL=*TCP,IP-ADDRESS=192.168.138.xxx))
```

The complete format of the BS2000 commands is described in the manual “*open*Net Server (BS2000/OSD) - BCAM” [17].

9.6.2.2 LOCLAN between guest systems

Connections between the local X2000 and the local BS2000 via TCP/IP can be used by means of LOCLAN. This connection is emulated by X2000. If LOCLAN is used, the packet size may be up to 64 kbytes.

Under VM2000 this connection also allows a rapid LAN connection between the guest systems and the monitor system via TCP/IP. In principle the connection between the guest system and monitor system can also be made via a ZASLAN device, but here the packet size is limited to the CSMA-CD process (Ethernet: 1500 bytes; Jumbo Frames: 9000 bytes).

Application scenarios for LOCLAN between guest systems

- File transfer between guest systems
- RFA connection between guest systems
- XCS cluster or CCS cluster of guest systems

Configuration for LOCLAN usage

The following an example of the entire configuration for an SX server with VM2000:

LOCLAN-IP address Solaris page: `192.168.138.12` (default)

The following IP addresses are used for generating the LOCLAN devices

Y0, Y1 for VM1:	IP address `192.168.138.2`	(pre-generated)
Y4, Y5 for VM2:	IP address `192.168.138.6`	

The names `LOCVM1` and `LOCVM2` are assigned for the names of the guest systems via the LOCLAN connection, unlike the names `TESTVM1` and `TESTVM2` used for ZASLAN configuration. No further details are given here of the ZASLAN configuration.

Conditions: No additional hardware conditions are required.

Configuration in PRIMEPOWER ServerView

– For BS2000, LOCLAN devices must be configured in X2000 (via *BS2000 LAN Ports -> Create*).
– A pair of devices (`Xn` and `X(n+1)`) must be generated as the LOCLAN device for each guest system (the LOCLAN devices `Y0` and `Y1` are pre-generated for the monitor system).
– When configuring in X200 the HSI LOCLAN and the mnemotechical device names `MN Xn` and `X(n+1)` of the devices must be entered in the input mask.
– The IP addresses selected must belong to the same local network.

Example of VM2 guest system

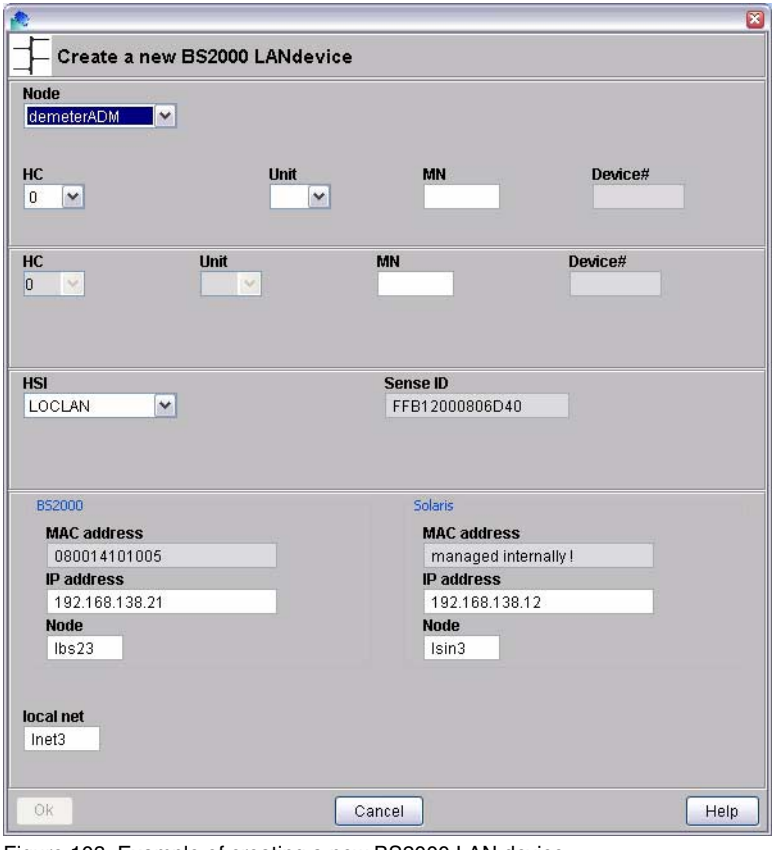


Figure 103: Example of creating a new BS2000 LAN device

The same applies to all other guest systems.

Configuration in VM2000

The communication devices must be assigned to the appropriate guest system.This is done, using the example above, by entering the following VM2000 administration commands:

```
/ADD-VM-DEVICES (Y0,Y1),VM-ID=1
/ADD-VM-DEVICES (Y4,Y5),VM-ID=2
```

Configuration in guest systems

The connection paths must be made known to BCAM in all guest systems, either statically in the corresponding RDF files or dynamically using the corresponding BCAM commands in SDF format.

The basic SOF file $TSOS.SOF.SX2000, which contains the entries for LOCLAN and LOCSIN, is shipped with the pre-installed standby system.

For VM1:

```
/DCOPT HOST=TESTVM1,...
/BCOPTION BROADCAST=ON,ARP=ON
/CREATE-NODE NODE-NAME=LOCLAN
/CREATE-LINE LINE-NAME=LOCLAN,IP-ADDRESS=192.168.138.002,-
/  L2-PROTOCOL=*CSMACD(NODE-NAME=LOCLAN,-
/  MAX-LPDU-SIZE=*BY-DEVICE,-
/  WRITE-DEVICE=Y0,READ-DEVICE=Y1)
/BCACT NODE=LOCLAN
/ACTIVATE-LINE LINE=LOCLAN
/CREATE-PROC PROC-NAME=LOCSIN
/CREATE-ROUTE ROUTE-NAME=LOCSIN,PROCESSOR-NAME=LOCSIN,-
/  PATH=*NODE(NODE-NAME=LOCLAN,LINE-NAME=LOCLAN,-
/  L3-PROT=*IP(L4-PROTOCOL=*TCP,IP-ADDRESS=192.168.138.012))
/BCACT LOCSIN
/CREATE-PROC PROC-NAME=LOCVM2
/CREATE-ROUTE ROUTE-NAME=LOCVM2,PROCESSOR-NAME=LOCVM2,-
/  PATH=*NODE(NODE-NAME=LOCLAN,LINE-NAME=LOCLAN,-
/  L3-PROT=*IP(L4-PROTOCOL=*TCP,IP-ADDRESS=192.168.138.6))
/BCACT LOCVM2
/CREATE-...
```

For VM2:

```
/DCOPT HOST=TESTVM2,...
/BCOPTION BROADCAST=ON,ARP=ON
/CREATE-NODE NODE-NAME=LOCLAN
/CREATE-LINE LINE-NAME=LOCLAN,IP-ADDRESS=192.168.138.006,-
/  L2-PROTOCOL=*CSMACD(NODE-NAME=LOCLAN,-
/  MAX-LPDU-SIZE=*BY-DEVICE,-
/  WRITE-DEVICE=Y4,READ-DEVICE=Y5)
/BCACT NODE=LOCLAN
/ACTIVATE-LINE LINE=LOCLAN
/CREATE-PROC PROC-NAME=LOCSIN
/CREATE-ROUTE ROUTE-NAME=LOCSIN,PROCESSOR-NAME=LOCSIN,-
/  PATH=*NODE(NODE-NAME=LOCLAN,LINE-NAME=LOCLAN,-
/  L3-PROT=*IP(L4-PROTOCOL=*TCP,IP-ADDRESS=192.168.138.012))
/BCACT LOCSIN
/CREATE-PROC PROC-NAME=LOCVM1
/CREATE-ROUTE ROUTE-NAME=LOCVM1,PROCESSOR-NAME=LOCVM1,-
/  PATH=*NODE(NODE-NAME=LOCLAN,LINE-NAME=LOCLAN,-
/  L3-PROT=*IP(L4-PROTOCOL=*TCP,IP-ADDRESS=192.168.138.2))
/BCACT LOCVM1
/CREATE-...
```

9.6.2.3 ZASLAN

> **i** You cannot configure any BS2000 ZASLAN device on the onboard LAN controllers hme 0, hme 1, etc.

If you use TCP/IP or ISO-LAN connections via an Ethernet cable between the local BS2000 and other systems then you should set ZASLAN. This is the only way that BS2000 can obtain a direct view of the physical network.

You must also configure the ZASLAN device in the local BS2000 system.

Example for IP

```
/CREATE-NODE NODE-NAME=...
/CREATE-LINE LINE-NAME=...,IP-ADDRESS=nnn.nnn.nnn.nnn,                -
/   L2-PROTOCOL=*CSMACD(NODE-NAME=...,WRITE-DEV=mn,READ-DEV=mn ,...
/BCIN ...,INI=ALL,ACT=ALL
/CREATE-PROCESSOR PROCESSOR-NAME=...
/CREATE-ROUTE ROUTE-NAME=... ,PROC-NAME=...,                          -
/   PATH=*NODE(NODE-NAME=...,LINE-NAME=...,                           -
/   L3-PROTOCOL=*IP(IP-ADDRESS=nnn.nnn.nnn.nnn))
/BCACT ROUTE=...
```

In order to use frame sizes above the Ethernet standard size, you must possess a Gigabit Ethernet board (Solaris name = fjgi[1]). In this case, you must perform the following configuration steps:

X2000

Example for the configuration of the fjgi driver:

– You must add the entry `set fjgi:fjgi_jumbo=1` in the file `/etc/system`.

– You must also create a file `/etc/fjmtu.fjgiX` in which you should enter an MTU size of between 1500 and 9000. `X` is the board number of the required fjgi port.

– You must then perform a reboot (`init 6`).

> **i** In Jumbo mode it is not possible to send or receive any IEEE802.3 packages.
>
> In the case of FTP connections, you should choose an MTU size smaller than 8232 bytes.
>
> All the configuration possibilities for the fjgi driver are contained in the “FUJITSU PCI GigabitEthernet User's Guide”. This Guide is present as an online manual in the FJSVged driver package on the Control CD.

1. The predecessor was fjge with the corresponding fjge driver and analog configuration

BS2000

```
/CREATE-NODE .....
/CREATE-LINE ..... ,L2-PROTOCOL=*CSMACD(...,MAX-LPDU-SIZE=*BY-DEVICE)
/CREATE-PROCESSOR ...
/CREATE-ROUTE ..... ,L3-PROTOCOL=*IP(...)
/BCACT ...
```

The following restrictions must be borne in mind when operating this configuration.

All the network components (switches, routers etc.) and all terminals must be configured with this setting.

This configuration is only permitted with the TCP/IP protocol.

Redundant and DR-secure BCAM connections

In a partition in which DR processes are planned, redundant BCAM connections using two system boards are required as in the following example:

```
/DCOPT ...
/BCOPTION ...
/
/CREATE-NODE NODE-NAME=RZLAN, -
/     IP-SUBNET-MASK=255.255.0.0
/
/CREATE-LINE LINE-NAME=RZLAN#1, -
/     L2-PROTOCOL=*CSMACD(NODE-NAME=RZLAN, -
/       WRITE-DEVICE=G4,READ-DEVICE=G5, -
/       SLOW-POLL=*ON,ROUTE-RESWITCHING=*ON),-
/     IP-ADDRESS=140.1.0.2
/
/CREATE-LINE LINE-NAME=RZLAN#2, -
/     L2-PROTOCOL=*CSMACD(NODE-NAME=RZLAN, -
/       WRITE-DEVICE=J4,READ-DEVICE=J5,-
/       SLOW-POLL=*ON,ROUTE-RESWITCHING=*ON),-
/     IP-ADDRESS=140.1.0.12
/
/CREATE-PROCESSOR PROCESSOR-NAME=RZLANFW1
/CREATE-ROUTE ROUTE-NAME=RZLANFW1, -
/     PATH=*NODE(NODE-NAME=RZLAN, -
/       LINE-NAME=RZLAN#1, -
/       L3-PROTOCOL=*IP(IP-ADDRESS=140.1.60.4, -
/         OWN-IP-ADDRESS=140.1.0.2))
/...
/BCACT NODE=RZLAN, ACT=ALL
/ACTIVATE-LINE LINE=RZLAN#1
/ACTIVATE-LINE LINE=RZLAN#2
```

- You must ensure that the device pairs (G4, G5) and (J4, J5) are located on different system boards.
- Meadia monitoring must be activated in X2000 (in PRIMEPOWER ServerView Suite): *BS2Devices* application --> *BS2 LAN Ports* tab --> *Configuration* menu item --> *Monitoring* tab). This ensures that the removal (or addition) of a LAN route BCAM is signaled and the connection thus retained.

9.6.3 Diagnostics for LAN ports

The *Diagnostics* function in the *BS2 LAN Ports* menu of the PRIMEPOWER ServerView Suite graphical user interface outputs internal statistical values and the current configuration settings. A detailed description of all callable diagnostic information is contained in the online help.

9.7 Offline PSR

9.7.1 Scope of function

PSR is a tool for the physical backup and restoring of data. Disks or individual slices of these disks can be written onto a backup medium and later read again from it.

PSR is operated on-line via PRIMEPOWER ServerView (see section “Functions” on page 210) and off-line via a Curses-based interface. The on-line mode is described in the PRIMEPOWER ServerView help texts. This section gives a guide to the off-line mode only.

PSR provides the following functions:

Save	Saves disks and slices on a selected backup medium. During the backup a checksum is written onto the backup medium for each data block.
Restore	Restores disks and slices from an existing backup
Copy	Copies a disk to another disk (this function is only supported in off-line operation).
Check tape	Reads the backup data and checks the checksums for each slice generated during backup.
Label	Displays the label of a backup, particularly of the generating system.

To be able to back up larger disks, PSR also controls next tape processing. When a tape comes to the end, PSR requests the next tape. Tapes which have been generated in the on-line mode can also be read off-line, and vice versa. In this case it must be remembered that only tape devices connected via SCSI (but not via Fibre Channel) can be addressed in the on-line mode.

9.7.2 Operation of the off-line PSR

In the off-line mode PSR is operated via its own Curses-based interface. The operation runs in the English language.

9.7.2.1 Starting the off-line PSR

PSR in SX entry-level models

Prerequisites: The CD0 of the Solaris installation record is required for off-line operation. A tape device and a prepared PSR tape must also be available. Further tapes may possibly have to be supplied for the backup.

Procedure:

1. Change to off-line operation. To start PSR off-line, the system must be booted from the CD0 of the Solaris installation record in the single-user mode. The procedure is as follows:
   a) Insert of the CD0 of the Solaris installation record.
   b) `init 0`: The system stops and remains in the OBP (Open Boot Prom).
   c) `boot cdrom -s`: The system boots from the CD and remains in the single-user mode.
2. Start PSR off-line. PSR is not present on the CD0, it is copied from the previously created PSR tape into the directory `/tmp` and is started there. The procedure is as follows:
   a) Change to the directory `/tmp`
   b) Specify the device path of the tape device, for example /`dev/rmt/0cn`. The device path is specified as follows:

      ```
      ls -l /dev/rmt/*cn
      ```

      If more than one device path is found, the path of the device type suitable for the tape must be specified. The following command prints out the device type:

      ```
      mt -f <Device path> status
      ```

   c) Insert the tape and unpack the tar-archive with the following command:

      ```
      tar xvf <device path>
      ```

   d) Remove the PSR tape

e) Start PSR off-line with the following command:

```
/tmp/psr
```

The procedure first sets the TERM variable for the SUN console, then calls PSR. PSR logs on with the basic menu.

PSR on SX servers with SMC

Prerequisites: A correctly installed SMC, with built-in DAT disk drive, is required for the off-line mode.

Procedure:

1. Prepare the SMC in the on-line mode. The SMC must be modified in the PSR menu *Prepare off-line PSR* for the off-line mode. For the procedure, see the PRIMEPOWER ServerView on-line help.
2. Change to the off-line mode:

   In the off-line mode, PSR is operated via the console. The system must first be run down to such an extent that it is in the OBP. This can be achieved in the current system with the following command:

   ```
   init 0
   ```

   When the OBP prompt (`ok`) appears, enter:

   ```
   boot obp-net -s
   ```

   The system is now booted to the single-user mode via the network. If the system prompt (#) appears, the enter the following:

   ```
   /mnt/psr
   ```

   The procedure first requests the root password of the SMC required for operating the DAT disk drive, sets the TERM variable for the SUN console after a further query, then calls PSR. PSR logs on with the basic menu.

9.7.2.2 The basic menu

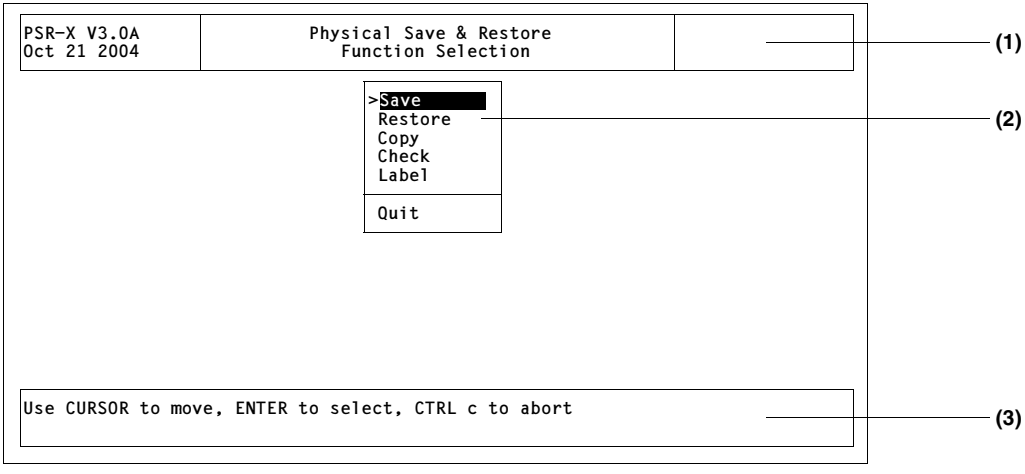


Figure 104: Basic menu of the off-line PSR

In the left field the header (1) contains the version and date of generation of the PSR. The title of the relevant menu appears in the centre. A PSR function may be selected in the selection field (2). To leave PSR, select “Quit”. As is usual in dialog-guided programs, PSR is operated by means of selected keys. The key functions are explained in the bottom field of the menu (3).

The following table lists all the keys used in PSR, with their function:

Entry	**Function**
Cursor keys	Move between menu items
RETURN	Select the current values and continue with PSR
ENTER SPACE	Move between menu items
TAB	Switch between menus
CTRL-C	Interrupt the current function
CTRL-L	Control-L screen refresh

9.7.2.3 Save

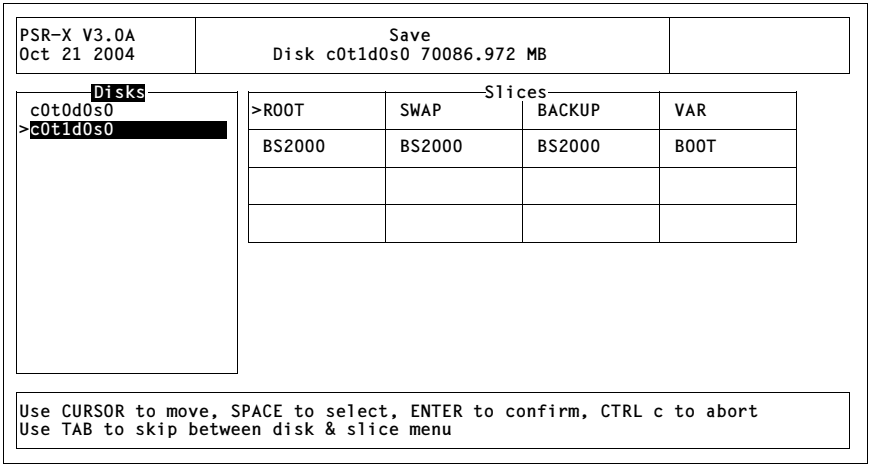


Figure 105: Slice selection

Use the “Save” function to save selected disks or slices to one or more tapes. The saving process starts with an analysis of the system and the connected disk drives. A two-part menu appears from which the corresponding disks/slices may be selected (see figure 105). The file system type is indicated for each slice and is coded in the slice tag. To save and to restore, the following are proposed: BOOT, ROOT, USR, VAR and HOME slice types and slices with a BS2000 system. SWAP or BACKUP slice types are not proposed for saving, nor are types which cannot be assigned. These are represented in the PSR selection form by the character string “NULL”.

After completion of the disk/slice selection, select the tape device (see figure 106). The backup can then be started.

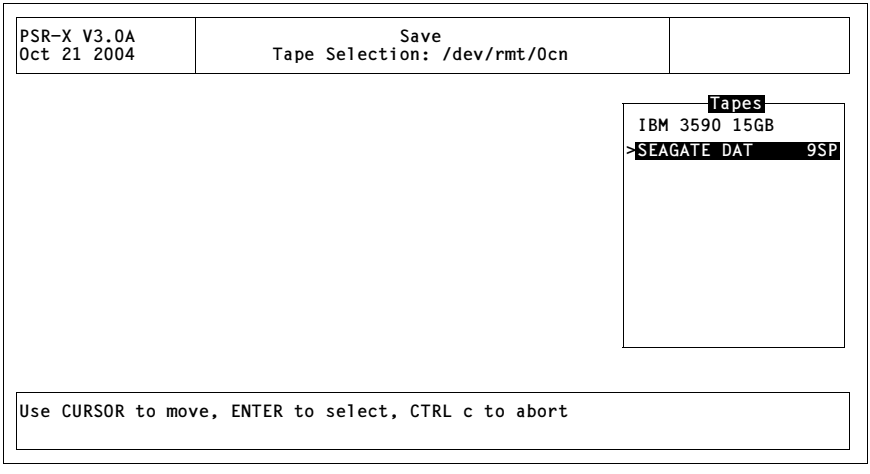


Figure 106: Selection of the tape device

The backup is carried out by slices.The data is read, the CRC checksum is calculated and written onto tape. The progress of the backup is logged on the screen:

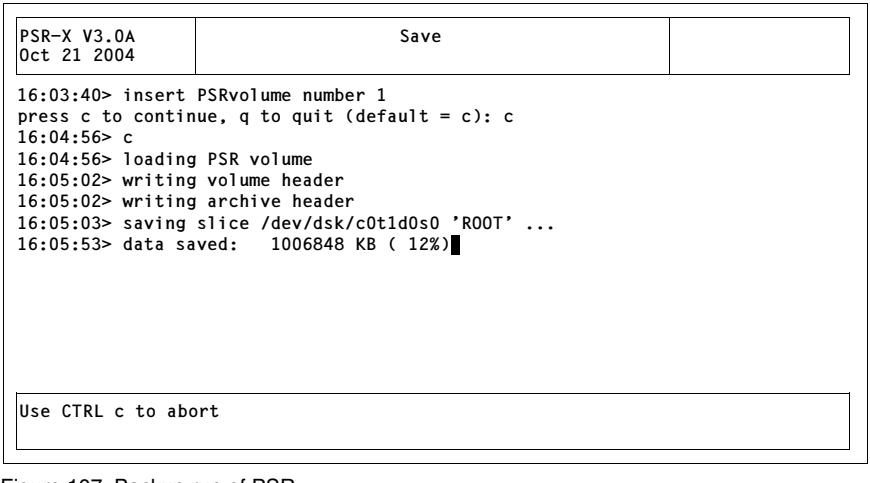

PSR-X V3.0A
Oct 21 2004
Save
16:03:40> insert PSRvolume number 1
press c to continue, q to quit (default = c): c
16:04:56> c
16:04:56> loading PSR volume
16:05:02> writing volume header
16:05:02> writing archive header
16:05:03> saving slice /dev/dsk/c0t1d0s0 'ROOT' ...
16:05:53> data saved: 1006848 KB (12%)
Use CTRL c to abort

Figure 107: Backup run of PSR

When the end of the tape and end of the backup are reached, the backup tape is rewound, ejected and, where necessary, a new tape is requested.

9.7.2.4 Restore

Restoring a disk from the tape takes place in the same way as saving, only in the reverse order. The menu for selecting the tape device (see figure 106) is first called. After a device has been selected the tape archive is read and the menu for disk or slice selection displayed (see figure 105). The disks or slices displayed are disks for which there is a backup on the tape. If a disk is selected which is not on the system, an error message to this effect is displayed.

The disk partition table for the backup is then compared with that for the physical disk. The result of the comparison can be one of the following:

1. The disk partition table for the backup is the same as that for the disk to be restored. Restoring is possible without repartitioning the disk.
2. The disk partition table for the backup differs from that for the disk to be restored. The conditions are then checked to determine whether the backup can be recorded onto the disk. There are two possibilities here:

   a) The disk to be restored has the same geometry as the disk from which the backup was generated. In this case the disk which is to be restored must be at least as large as the backed up disk. If this is the case the following query appears:

   ```
   Restoring to otherwise partitioned disk, do you want to continue?
   ```

   If acknowledged by Y (for Yes), PSR regenerates the disk partition table.

   b) The disk to be restored does not have the same geometry as the backed up disk. The following message appears:

   ```
   Copying to disk with different geometry, do you want to continue?
   ```

   After the message is acknowledged with Y (for Yes), the disk partition table for the disk to be restored is adapted to the backup. The condition for this is that the target disk is large enough for the changed disk partitioning. This condition is checked after adaptation of the disk partition table. The disk is then partitioned and the backup recorded.

9.7.2.5 Copy

In the off-line mode PSR enables the disk copying; the full content of a hard disk can be copied to another hard disk. To do this, select the hard disk to be copied in the same way as you would if you were saving. This disk is referred to below as the “source disk”. The selection is made with the RETURN key because there is no sub-selection (selection of individual slices) for copying. After the source disk has been selected an area is opened on the right in which the target disk must be selected. The following cannot be selected:

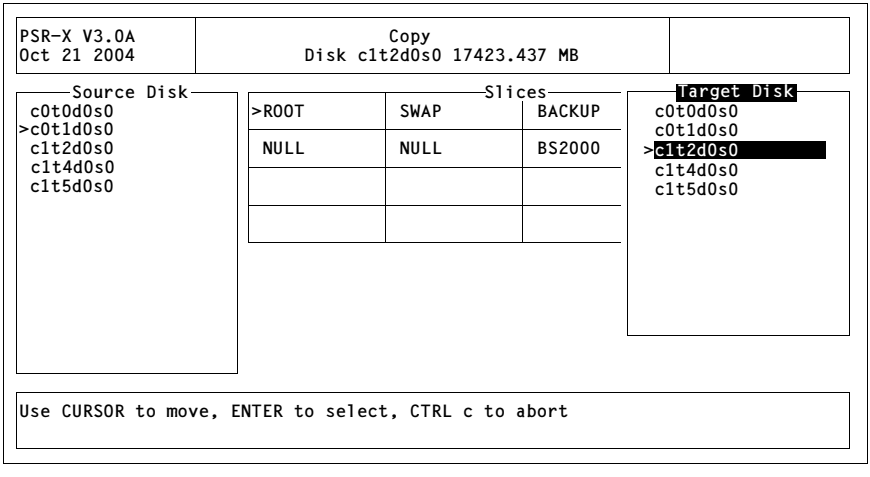


Figure 108: Setting a disk copy under PSR

– the source disk
– disks which have another geometry
– disks whose size is not large enough for the disk partition table adapted to the changed geometry

The sub-screen with the slices of the source disk, which is displayed in the centre, is for information only. Individual slices cannot be selected.

After the source disk and target disk have been selected, another prompt appears which must be acknowledged with c (continue).

9.7.2.6 Check

Unlike Restore, the Check function only checks the CRC checksum of the data read. However, there is no rewriting onto the disk.

9.7.2.7 Label

The Label function is used to identify backup tapes. Every tape written by PSR is identified by a unique label consisting of the following sections:

– a PSR-specific recognition mark, namely the character string “PSR”
– the PSR version with which the tape was generated (e.g. “3.0A”).
– the exact time of backup generation
– the tape sequence number, if the backup includes several tapes.

9.7.3 Supported hardware

PSR V3.0 can be used on all SX servers.

9.7.3.1 System type SX entry-level model

Supported tape drives:

Type	Supported off-line	Remark
HP C5683A DAT	yes	SCSI connection
MBK 9084-110	yes	SCSI connection
3591 (Magstar) EF	no	Fibre Channel connection

Supported disk drives:

All disks which are released for the entry-level models of the SX series are supported in online and offline mode.

9.7.3.2 System type SX server with SMC

Supported tape drives:

Type	Supported off-line	Remark
Sony DAT SDT10000	yes	directly or via LAN to SMC
Sony DAT SDT11000	yes	directly or via LAN to SMC
Seagate DAT 9SP40		directly or via LAN to SMC
MBK 9084-110	yes	SCSI connection
3591 (Magstar) EF	no	Fibre Channel connection

In the case of tape devices with a stacker only the manual mode is supported.

Supported disk drives:

All disks which are released for the SMC and for the X2000/Solaris partitions of the SX server are supported in online and offline mode.

10 Dynamic Reconfiguration

The “Dynamic Reconfiguration” (DR) functionality described in this section exists on BS2000 partitions of SX servers as of the SX150 model series, both native BS2000 and VM2000 being able to run in a BS2000 partition.

Dynamic Reconfiguration of Solaris partitions is possible as already on servers of the SX130 and SX140 model series.

10.1 Functional scope, concepts and applications

The following sections describe the functional scope, features and prerequisites for DR, the DR concept for BS2000, applications for DR, and recommendations and DR scenarios based on an example.

10.1.1 Functional scope and features

The PRIMEPOWER Enterprise Servers – the hardware basis for SX150 servers – offer not only the option of dividing the hardware statically in partitions consisting of one or more system boards, but, with Dynamic Reconfiguration (DR), also the option of removing system boards from or adding them to a partition during ongoing operation, i.e. dynamically.

The partitions of a server as of the SX150 model series use the system boards in extended system board mode (XSB mode):

The hardware unit which can be added or removed during DR is the extended system board (XSB), a subunit of the system board.

An XSB is either integrated into a partition or contained in the pool of free XSBs (XSB system board pool). Further more an XSB can be assigned to one or to no partition.
An XSB can be configured into a partition if it is contained in the XSB system board pool and is not assigned to another partition.
An XSB can be removed from a partition if it is integrated in this partition or assigned to it (see “The XSB attributes “integrated” and “assigned”” on page 303). In the first case a DR action (addition or removal) for this XSB can only be performed within the partition; in the second case the XSB can be assigned to any partition.

The benefits of extended partitioning (XPAR) compared to physical partitioning (PPAR, based on the physical system board mode (PSB mode)) are as follows:

- Greater flexibility
  The smaller hardware granularity means that greater flexibility is achieved on the SX150 servers in the event of changing utilization of the hardware resources by the partitions.
- Higher availability
  If a hardware component fails a larger porportion of the hardware resources remains operational.

This chapter describes the implementation and the application options of DR for the BS2000 partitions of SX150 servers.

If more than one partition is used on an SX150 server, dependencies can arise in the DR scenarios regardless of the type of partition (BS2000 or Solaris partition). These must be clarified and taken into account in each particular case.

The requirements which must be met for a Solaris partition with DR capability are not dealt with in detail here. Information on this is contained in the manual “Dynamic Reconfiguration” [25]. In the description below Solaris partitions with DR capability are always assumed.

Functions

The following functions are available in BS2000 partitions for performing Dynamic Reconfiguration:

- **DR-connect**
  Connection of an XSB with implicit attachment (ATTACH) of the CPUs, the memory and the I/O devices in BS2000/VM2000.
  DR-connect is only accepted for an XSB which is assigned either to the home partition or the pool of free XSBs.
  CPUs are attached in accordance with the existing licenses, and memory according to the limit set for the BS2000 memory.
  Caution: It is, however, not possible to guarantee that all the memory added is available for BS2000. This is only certainly the case after Solaris has been rebooted.
  A UHPS is not made available if the XSB to which it is connected is added to the partition using *DR-connect*. The UHPS can only be used after the next reboot.

- **DR-disconnect**
  Disconnection of an XSB with implicit detachment (DETACH) of the CPUs and the I/O ports (exception: UHPS) in BS2000/VM2000.
  An XSB on which a UHPS is put into operation or on which usable memory is available cannot be removed using *DR-disconnect*.
  DR-disconnect is only accepted for an XSB which is either integrated in or assigned to the home partition.
  The assignment of an XSB can be defined when it is disconnected from a partition.

- **Automatic recovery function**
  In a BS2000 partition with DR capability this function ensures that after a system reboot which was caused by a component failure (consequence: XSB failure), the system board with the failed XSB can be serviced for this partition during ongoing operation.
  Specifically this means:
  As the boot XSB the automatic recovery function selects an XSB located on a different system board from the one affected by the failure. On the XSBs which are located on the system board to be repaired and integrated in the partition concerned, only the CPUs are put into operation.
  Both the memory and the I/O ports (including UHPS) are thus made unusable.

Consulting recommendation

Configuring an SX server with DR capability to suit actual requirements and implementing a cross-partition DR concept are complex tasks.
The recommended procedure is to design the DR scenarios before you obtain an SX server and to define the SX server configuration in such a way that the required DR scenarios are possible. Depending on the planned application scenario for DR, the configuration of the standard SX150 models may need to be expanded.
To do this, please contact your sales representative at Fujitsu Siemens Computers GmbH.

10.1.2 Applications for DR and recommendations

Dynamic Reconfiguration can always be used during ongoing operation in the following cases:

– Global resource management / dynamic workload distribution between partitions
– CoD (Capacity on Demand)
– Online maintenance of the hardware after faults

Global resource management / dynamic workload distribution between partitions

On systems as of the SX150 model series it is possible to switch resources backward and forward between partitions within a system during ongoing operation, thus enabling the resources of the partitions to be adjusted to changing workload situations. The CoD models in a local partition which are described in the section below represent some of the global server options mentioned.

Reconfiguration is performed by calling the *DR-connect* and *DR-disconnect* functions (see page 286) in the partition concerned.

The principle

In a process designed for all servers one (or more) XSB(s) – the granularity of the resource reconfiguration is the extended system board (XSB) – is removed from a partition, i.e. withdrawn from access by the operating system of this partition, and integrated in another partition. This measure is undone later or the XSB is made available to another partition. You must ensure at all times that the license conditions are satisfied in every partition.

An example

Such a redistribution of the hardware resources makes sense or is even necessary if a partition is, for example, planned for the execution of batch jobs for accounting at the end of the month and more resources are to be made available for these batch jobs during this period than normally. For the period of the accounting run this partition is then assigned an additional XSB which is reassigned to the original partition at the end of the run.

Automation

This type of redistribution can also be automated within event- or time-driven procedures. Event-driven redistribution based on the conditions defined by the user being met can be implemented using *open*SM2 (see the manual “*open*SM2” [18]). The *Tasks* application of the PRIMEPOWER ServerView Suite offers a mechanism for time-driven jobs.

CoD (Capacity on Demand)

Capacity on Demand (CoD) makes additional CPU power available when required in the context of purchased licenses.

This is possible on the one hand when there are extra CoD-CPUs installed on the XSBs used by the partition in addition to the CPUs purchased. On the other hand, from the SX150 model series on additional XSBs can be added dynamically to the partition and their CPUs used for CoD.

The CoD-CPUs are then attached during live operations (explicitly) when there is an increased performance requirement and are detached (explicitly) once the workload peak has passed.

Comments

– The CoD-CPUs in the BS2000 environment are also referred to as “extra” CPUs.

– A CoD-CPU also functions as a “cold spare” CPU, i.e. after a CPU has failed and a reboot has taken place, this CPU replaces a “normal” CPU.

Important note
The “extra” CPUs must be released explicitly before *DR-disconnect* takes place for a CoD-XSB:

– In the case of native BS2000 with
`/DETACH-DEVICE UNIT=*EXTRA-CPU(*ALL)`

– In the case of VM2000 with
`/DETACH-VM-RESOURCE UNIT=*EXTRA-CPU(*ALL)`

Otherwise BS2000 rejects the DR request with the console message `ETMDR05` or VM2000 does this with the message `VMS4555`.

Online maintenance of the hardware after a fault occurs

After a component or the entire XSB has failed, a Solaris reboot takes place in the partition involved and the faulty XSB is not put into operation again.

As of the SX150 model series, the automatic recovery function selects as the boot XSB an XSB located on a different system board from the one affected by the failure. On the XSBs which are located on the system board to be repaired, only the CPUs are put into operation.

In the context of online maintenance these XSBs are removed using DR methods (*DR-disconnect*). It may also be necessary to remove other XSBs from other partitions which are located on the same system board from these partitions (using DR or a reboot).

The system board can then be removed. It can be replaced or reinstalled after it has been repaired.

In both cases the same DR method (*DR-connect*) is used in order to reconnect the XSBs of the repaired or replaced system boards and thus restore the original status.

It may be necessary to put the XSBs from the other partitions back into operation.

Cross-partition DR concept

The DR applications described the general recommendation applies that the DR concepts for the individual partitions of a system must be harmonized with each other:

– A cross-partition strategy for dynamic resource management must be devised in accordance with the customer's requirements.

– For online maintenance, dependencies arising from the parallel operation of multiple partitions must also be taken into account when a cross-partition strategy is defined.

10.1.3 The DR concept for BS2000

The DR processes in BS2000 partitions are performed at Solaris level, either from the graphical interface PRIMEPOWER ServerView or using the command interface.

DR of XSBs in BS2000 partitions is supported in X2000 and BS2000/VM2000 by functions which relieve the user of many important tasks.

DR-connect

When an XSB is added to a partition the user's activities are restricted to the following tasks:

1. Initiating the DR process (from PRIMEPOWER ServerView or using a command)
2. Validating devices which become available with the XSB for use by BS2000 applications
3. Increasing the BS2000 workload (optional)

With *DR-connect* the functions for DR support in X2000 and BS2000/VM2000 ensure that the resources of the added XSB are integrated into the existing structures so that they can be used by the system and the BS2000 applications. This means, among other things:

– An ATTACH is performed automatically in BS2000/VM2000 for the "normal" CPUs concerned.

– The path configuration of PowerPath devices which gain an additional path through the XSB is automatically extended.

– An ATTACH is automatically performed in BS2000 for BS2000 devices which are additionally made available by the XSB if these devices are not already known.

– A redundant Solaris network port which becomes additionally available through the XSB is automatically activated in IPMP.

– A redundant ZASLAN network port which becomes additionally available through the XSB is automatically activated in BCAM.

DR-disconnect

When an XSB is removed from a partition the user's activities are restricted to the following tasks:

1. Adjusting the BS2000 workload to the forthcoming performance reduction.
2. Devices which are connected exclusively to the XSB must be released by BS2000 applications.
3. Releasing devices which are connected exclusively to the XSB and are reserved by BS2000 applications. Under VM2000 the assignment of these devices as "shared" devices for multiple VMs must be canceled.

4. Releasing any “extra” CPUs which are used:
   – In the case of native BS2000 with `/DETACH-DEVICE UNIT=*EXTRA-CPU(*ALL)`
   – In the case of VM2000 with `/DETACH-VM-RESOURCE UNIT=*EXTRA-CPU(*ALL)`
5. Initiating the DR process (from PRIMEPOWER ServerView or using a command).

With *DR-disconnect* the functions for DR support in X2000 and BS2000/VM2000 provide the configuration modifications which are necessary to withdraw the resources of the XSB affected from the system. This means, among other things:

- An `DETACH` is performed automatically in BS2000 for BS2000 devices which are connected exclusively to the XSB.
- The path configuration of PowerPath devices which have a connection to the XSB is automatically shortened.
- A disk mirror which is connected to the XSB is automatically removed from the mirror disk.
- A redundant Solaris network port on the XSB is automatically deactivated in IPMP.
- A redundant ZASLAN network port on the XSB is automatically deactivated in BCAM. Alternate path are switched to.

10.1.4 Requirements for DR

With the requirements for DR a distinction is made below between the hardware and configuration requirements and the situation-dependent requirements.

Hardware and configuration requirements

- Distribution of the XSBs of each partition to 2 physical system boards.
  The options are model-dependent (for details please also see table 17 on page 403).
  Models with all their XSBs on one system board only have limited DR capability because maintenance during ongoing operation is not possible in this case.
  CoD and dynamic workload distribution, on the other hand, are possible.
  A bootable XSB exists on each system board.
- Equipping of the XSBs with sufficient memory and CPUs to ensure the operational integrity of the system with the XSBs of just one system board after a hardware failure.
  The options are model-dependent (for details please also see table 17 on page 403).

  Notes

  1. In addition to the memory specified in the basic configuration, spare memory can also be kept available which is used during online maintenance to compensate for the temporary loss of resources. Spare memory can be provided in the form of an 8-GB memory extension which is only used in part in normal operation or as memory on an XSB which is not used in normal operation (spare XSB).
  2. If the main memory is reduced and the workload is not adjusted, saturation levels and increased paging rates can occur.
- Redundancy of the hardware resources and their configuration on both system boards (e.g. console ports and mirrored boot disk):
  For example, in the case of *DR-disconnect* the last console path remaining in the partition and the last active disk mirror of the X2000 boot disk remaining in the partition may not be located on the XSB. In the latter case no mirror disk may be in the *RESYNC* state, either.
- Redundancy of the LAN configuration (both for the admin LAN and the user LAN) by implementing multipath capability using different system boards:
  – In the admin LAN IPMP (IP multipathing) must be used for this at Solaris level. Corresponding hardware connections must be provided and in the IPMP configuration it must be ensured that all LAN connections remain available even after all the XSBs of a system board have been disconnected. When *DR-disconnect* is used the XSB may not contain the last network port of an IPMP group remaining in the partition (see also the System Administrator Guide: IP-Services" [33]).
  – At ZASLAN level (user LAN) a redundant, DR-secure BCAM configuration must be created. Details of this are described in the section "ZASLAN" on page 271.

- Redundant connection of the BS2000 devices on both system boards:
  The XSB may not contain the only or last path to a device – in particular the home pubset must be taken into account here – which cannot be placed in the `DETACHED` state.
  This condition is satisfied in the case of a redundant hardware connection and by the use of PowerPath (see also the “PowerPath” manual [34]).

Situation-dependent requirements

When it is started, BS2000/VM2000 has control over whether a DR process is initiated and, if the process is a *DR-disconnect* which affects the resources of BS2000/VM2000, control over whether the resources are released, or whether they are not released and the DR process is therefore aborted.

- Taking the workload conditions into consideration
  Performing a DR process in a peak-workload period is not practical. You must therefore think ahead when planning the DR scenarios CoD and workload distribution to ensure that DR is performed in a phase with little workload.
  In planning workload distribution you must take into account that the peak-workload phases are staggered sufficiently in the partitions of the SX server which alternate in their use of an XSB alternately .
  Sufficient spare resources should be kept available to be able to replace failed resources if a hardware failure occurs during the peak-workload phase.
- State of BS2000/VM2000
  BS2000/VM2000 must be in a state which is compatible with the initiation of the DR process.
  This is the case when one of the following points applies:
  - BS2000/VM2000 is started and agrees that the DR process should be initiated. This is, for example, the case when BS2000/VM2000 has entered the *System Ready* state after an IPL.
  - No IPL was performed after X2000 was started.
  - BS2000/VM2000 is shut down and set no DR lock when it shut down.
    For example, the DR lock is set if a SLED is performed after system shutdown (abnormal shutdown procedure, SETS).
  - The DR lock was canceled with the `bs2dr -reset` command.
  - HIPLEX MSCF must permit the DR process.
  - The BS2000/VM2000 resources which are lost with *DR-disconnect* should not be reserved by the system or by applications. In each case BS2000/VM2000 decides whether it will withdraw a resource from the system or from an application or abort the DR process.

  - In the case of *DR-disconnect* no “extra” CPU may be connected in BS2000/VM2000.

- No parallel actions
  Configuration measures which are performed in parallel to a DR process can prevent the DR process from running successfully. The same applies for Solaris applications which access the resources of an affected XSB in parallel to a DR process.
  The following actions should not be performed during a DR process:

  - No second DR process may be started – any attempt to do so is rejected. Only one DR process can run on an SX server at any one time. DR processes are serialized between the partitions of an SX server.
  - No PHP process (PCI Hot Plug) may be performed. Any attempt to initiate one with the `x2php` command is rejected.
  - In PRIMEPOWER ServerView no BS2000 device may be configured on the XSB concerned.
  - In BS2000 no `ATTACH-DEVICE` may be entered for a device on the XSB concerned.
  - In Solaris no PowerPath and no disk mirror may be configured on the XSB concerned.

  Failure to observe the recommendations given can lead to problems, e.g. to considerable delays.

10.1.5 An example of the DR scenarios

In this example an SX150 server with one BS2000 and one Solaris partition and a free XSB is used. The following is assumed here:

- The BS2000 partition (model variant SX150-40C) is configured as follows:

  XSB 00-0: 1 CPU, 8 GB memory;
  boot-XSB in the basic configuration / primary boot-XSB

  XSB 00-1: 2 CPUs, no usable memory and no usable I/O ports
  (OBP parameters `no-obp-sb`, `no-mem-sb`, `no-io-sb` set; CPU-XSB)

  XSB 01-0: 2 CPUs, 8 GB memory; secondary boot-XSB

  BS2000 works with 4 BS2000 CPUs (one of the 5 CPUs is for X2000) and, in line with the SX150 model (see table 17 on page 403), uses 10 GB of memory as its main memory (2 GB for X2000/Solaris, 4 GB are unused in the initial status).

  All requirements (see page 293) for the DR capability of this partition, e.g. redundant connection and configuration of the devices (console, LAN, etc.) on the primary boot-XSB 00-0 and the secondary boot-XSB 01-0 are satisfied.

- In the initial status XSBs 00-2 and 00-3 are integrated into a Solaris partition.
- The two CoD-CPUs are implemented using XSB 01-1 with 2 CPUs (and 8 GB of memory and 3 PCI slots).

  This XSB can be operated in the periods when it is not used by the Bs2000 partition, in the Solaris partition or in a separate Solaris partition.

- XSBs 01-2 and 01-3 are not present.
- The hardware ports of the peripherals are implemented with redundancy via the PCI slots of XSBs 00-0 and 01-0.

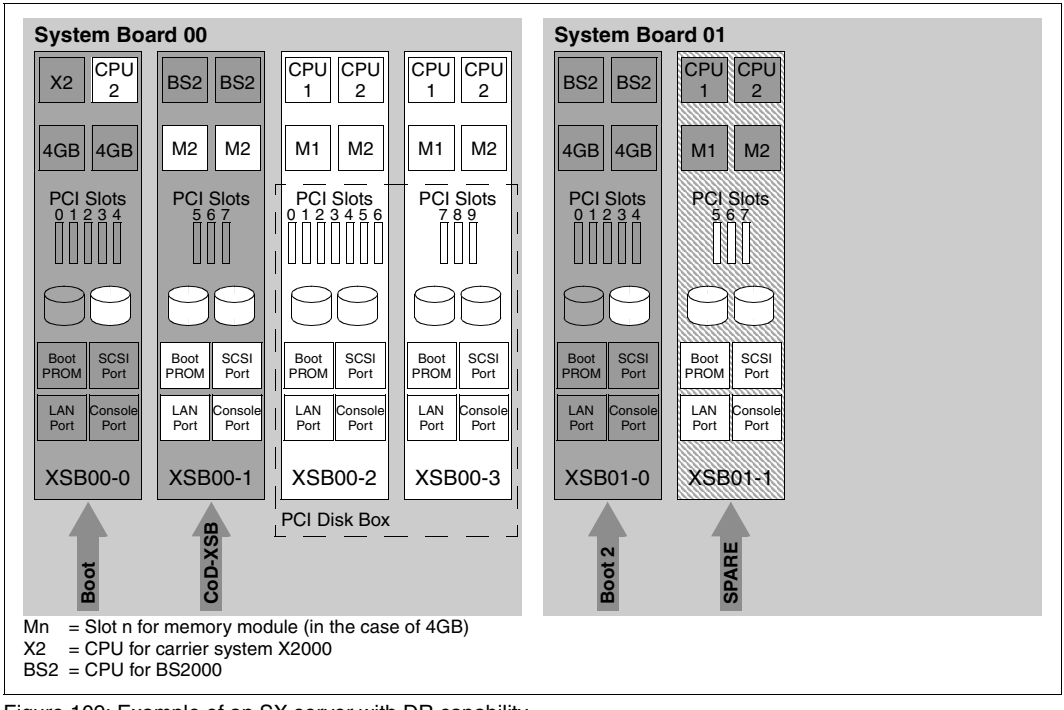


Figure 109: Example of an SX server with DR capability

Because of its configuration this SX150 server has multiple DR capabilities. Some major DR applications for the BS2000 partition of this SX150 server are described in the following. When looking at the memory the ideal case is always assumed, i.e. that all the memory which is connected during the DR actions is assigned for BS2000.

Cross-partition resource management and CoD

Temporary connection of additional CPU performance

The temporary connection of additional XSBs (CoD-XSB) to use their CPU power is possible in accordance with the licenses purchased.

The following CPUs, for example, can be attached:

– CPUs of the free XSB 01-1
– CPUs of an XSB which was removed from the Solaris partition

With the additional resources the partition then corresponds to the SX150-50C model (+ 1 CPU) or the SX150-60C model (+ 2 CPUs).

These CoD-XSBs can only be used as CPU-XSBs. To permit dynamic disconnection of the CoD-XSBs from the BS2000 partition later, `no-obp-sb`, `no-mem-sb` and `no-io-sb` must be set for them. For details see the section “Settings relevant to DR” on page 321.

Temporary releasing of CPU performance

The additional CPU performance added earlier can be released temporarily at any time by disconnecting CPUs of XSB 00-1 or by removing XSB 00-1.

This CPU performance can then be used by the Solaris partition without any additional cost.

Cross-partition concept

A cross-partition concept for using the CPU performance should be implemented for the customer. The following must be taken into consideration here:

- When planning the procedures you must bear in mind that the peak-workload phases in the partitions of the SX server must be sufficiently staggered.
- The DR command interface offered in Solaris has script capability. CPU performance can be added or released using a time-driven script (Cron job; for details please see the *Tasks* application in PRIMEPOWER ServerView Suite) or on an event-driven basis (for the options available see the manual *“open*SM2” [18]).

Online maintenance

In the information below it is assumed that XSB 00-0 fails. Similar maintenance scenarios can be devised for the failure of another XSB.

The following situation results when XSB 00-0 fails:

- New boot-XSB 01-0:
  After XSB 00-0 fails the automatic recovery function means that Solaris is booted from XSB 01-0 (secondary boot-XSB) which belongs to the other system board.
- XSB 00-1 on system board 00 is still used.
- The partition operates with reduced capacity, namely with 4 CPUs (3 BS2000 CPUs = 75%) and 8 GB of memory (6 GB of BS2000 main memory = 60%).
  With the remaining resources, in terms of its RPF performance the partition corresponds to the SX150-30C model.

Which of the three operating variants described below is selected until the BS2000 partition is restored to 100% capacity depends on the resource requirements of the active applications and the minimum performance requirement.

1. Temporary operation (until online maintenance) with reduced resources

The entire procedure is illustrated with the figure below (CPU and memory values relate to BS2000):

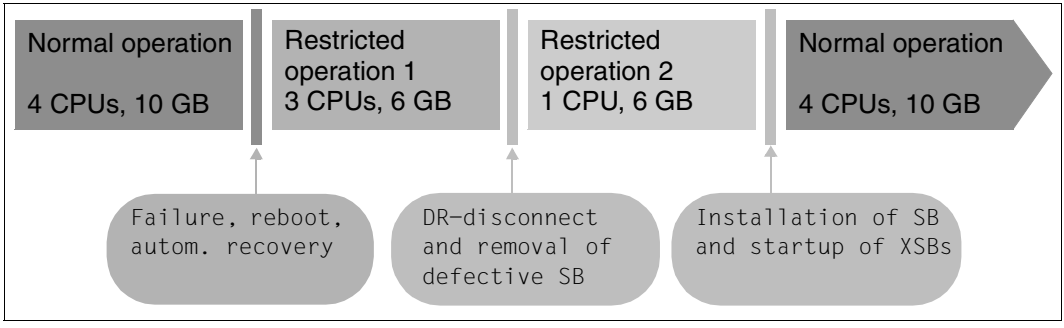


Figure 110: Online maintenance: Temporary operation (until online maintenance) with reduced resources

After the failure the BS2000 partition continues to operate with the above-mentioned reduced resources (see *Restricted operation 1* in figure 110, where the CPU and memory values relate to BS2000) until the next online maintenance is performed.

The measures described below are performed by the service engineer at a time selected by the customer, e.g. within a maintenance window:

1. XSB 00-1 can be disconnected from the partition using *DR-disconnect*, in which case the partition operates with 2 CPUs (1 BS2000-CPU = 25%) and 8 GB of memory (6 GB of BS2000 main memory = 60%) (see *Restricted operation 2* in figure 110).
   With the remaining resources, in terms of its RPF performance the partition corresponds to the SX150-10C model.
2. Remove the system board, repair or replace and install the system board.
3. Start up the two XSBs 00-0 und 00-1 with *DR-connect*.

This restores the initial status for this partition with 100% use of the CPUs and, in the ideal case, of the memory.

2. Temporary operation (until online maintenance) of theCPUs of CoD-XSB

The failure of hardware resources can be compensated for in part by puting the CPUs of XSB 01-1 into operation. The entire procedure is illustrated with the figure below:

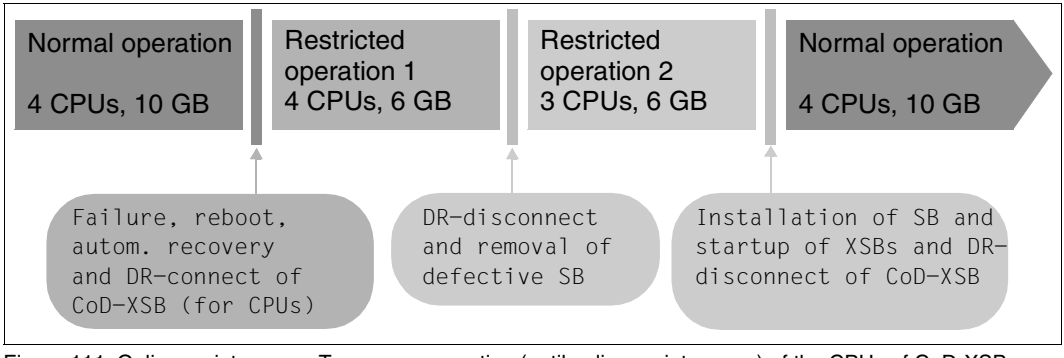

Normal operation
4 CPUs, 10 GB
Restricted operation 1
4 CPUs, 6 GB
Restricted operation 2
3 CPUs, 6 GB
Normal operation
4 CPUs, 10 GB
Failure, reboot, autom. recovery and DR-connect of CoD-XSB (for CPUs)
DR-disconnect and removal of defective SB
Installation of SB and startup of XSBs and DR-disconnect of CoD-XSB

Figure 111: Online maintenance: Temporary operation (until online maintenance) of the CPUs of CoD-XSB

Measures to be taken:

1. Performed by the service engineer or by the customer:
   For the period until the next maintenance window XSB 01-1 is connected as CPU-XSB (`no-obp-sb`, `no-mem-sb`, `no-io-sb`) using *DR-connect*.
   In terms of the CPU the partition works at full capacity (100%) and with the remaining 8 GB of memory (6 GB of BS2000 main memory = 60%). One CPU remains unused and can, if required, be connected as a CoD-CPU.

The subsequent measures are performed by the service engineer at a time selected by the customer within a maintenance window:

2. XSB 00-1 can be disconnected from the partition using *DR-disconnect*, in which case the partition operates with 4 CPUs (3 BS2000-CPUs = 75%) and 8 GB of memory (6 GB of main memory = 60%). The previously unused second CPU of XSB 01-1 is automatically put into operation.
   With the remaining resources, in terms of its RPF performance the partition corresponds to the SX150-10C model.
3. Remove the system board, repair or replace and install the system board.
4. Start up the two XSBs 00-0 und 00-1 with *DR-connect*.
5. Remove XSB 01-1 from the partition with *DR-disconnect*

This restores the initial status for this partition with 100% use of the CPUs and, in the ideal case, of the memory.

3. Permanent use of all resources of the CoD-XSB

The failure of hardware resources can be compensated for fully by puting XSBs 01-3 into operation with all its resources. The entire procedure is illustrated with the figure below:

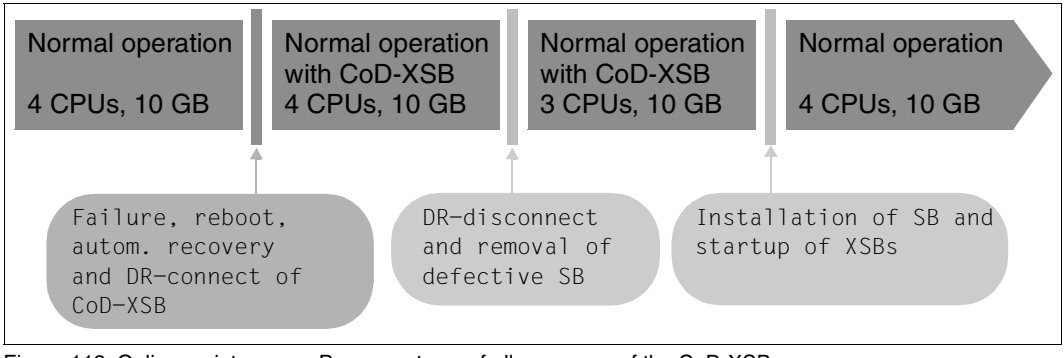


Figure 112: Online maintenance: Permanent use of all resources of the CoD-XSB

Measures to be taken:

1. Performed by the service engineer or by the customer:
   The spare-XSB 01-1 is added to the partition as a normal XSB with *DR-connect*, i.e. with use of the main memory.
   The partition works at 100% capacity until the next maintenance window. One CPU remains unused and can, if required, be used as a CoD-CPU.

The subsequent measures are performed by the service engineer at a time selected by the customer within a maintenance window:

2. The XSB 00-1 can be disconnected from the partition using *DR-disconnect*, in which case the partition operates with 4 CPUs (3 BS2000-CPUs = 75%) and still with 100% of the memory. The previously unused second CPU of XSB 01-1 is automatically put into operation.
   With the remaining resources, in terms of its RPF performance the partition corresponds to the SX150-10C model.
3. Remove the system board, repair or replace and install the system board.
4. Start up XSB 00-1 with *DR-connect*, automatically taking the second CPU of XSB 01-1 out of service.

This restores the initial status for this partition with 100% use of the CPUs and, in the ideal case, of the memory.

Important notes

- In this scenario the roles of XSBs 00-0 and 01-1 are swapped.
- XSB 01-3, which was originally kept in reserve, initially remains in the partition.
- The original boot-XSB 00-0 is initially not put into operation; it can take on the role of the CoD-XSB.
- At the earliest when Solaris is rebooted can the initial status be restored.
- A return to the initial status as soon as possible is recommended as no redundancy of the peripheral ports (ports in this status are only available via XSB 01-0) is provided. Furthermore, only in the context of Solaris being rebooted is it ensured that the planned memory is once more fully assigned to BS2000.

Final assessment

Keeping a reserve of free resources in the form of an additional XSB enables the hardware failure to be compensated for both in terms of the CPUs and the memory.

The most complex solution – provision of 100% capacity after a hardware failure – is thus the best possible solution.

10.2 Performing DR

The sections below describe the DR interfaces of the administrative interface PRIMEPOWER ServerView and the DR command interface. These are then followed by a description of further details and constraints relating to DR.

The XSB attributes “integrated” and “assigned”

The status of an XSB with regard to the partitions of the SX server can be described by the independent attributes **integrated** and **assigned**. The relevant status displays of the information interfaces and the action interfaces are described in the next two sections.

- **Integrated** means that the XSB was put into operation in the partition involved and is active. The status display in this status is *Configured* and *PID* = PID of the partition.
- **Assigned** means that the XSB is reserved for this partition. In the status display *Next PID* = PID of the partition is output. In this status of the reservation the XSB cannot be integrated or reserved by any other partition.
  If the reserved XSB is in the pool of free XSBs, it is automatically integrated after the reserving partition has been rebooted.
  An XSB can (after *Disconnect* with the *Disconnect at next reboot* option and the specification *Next partition*) simultanously be integrated in one partition and already assigned to another one.
  An XSB can also be assigned to the pool of free XSBs, in which case *Next PID* is assigned no value.

10.2.1 Administrative interface PRIMEPOWER ServerView

In the administrative interface PRIMEPOWER ServerView the functions required for DR are offered within the *VConfig* application.

Creating an overview of partitions and system boards

The assignment of the system boards (XSBs) to the partitions is output by activating the subtab *Systemboards DR* in the *Boards* tab of the *VConfig* application.

Example (extract)

Nodes | Cabinets | Boards | Controllers | Disks | MP Devices | Storage Devices | Vdisks | File systems | NFS | Hardware Presentation

Node	Cabinet	Board / Bus	PID	Next PID	State (HW)	State (DR)	HW Status	Kernel Code	Lock f
venusADM	PW900E_0101	Systemboard_0-0	0	0	ON	Configured	ok	yes	no
venusADM	PW900E_0101	Systemboard_1-0	0	0	ON	Configured	ok	no	no
venusADM	PW900E_0101	Systemboard_0-1	0	0	ON	Configured	ok	no	no
venusADM	PW900E_0101	Systemboard_1-1	0	0	ON	Configured	ok	no	no
demeterADM	PW900E_0101	Systemboard_0-2	1	1	ON	Configured	ok	yes	no
daphneADM	PW900E_0101	Systemboard_0-3	2	2	ON	Configured	ok	yes	no

Figure 113: Outputting an overview of partitions and system boards (example)

The hardware resources belonging to the partitions and their distribution to the system boards can be ascertained using the hierarchical browser of the *VConfig* application and indicated as icons under the *Hardware Presentation* tab.

Example (extract))

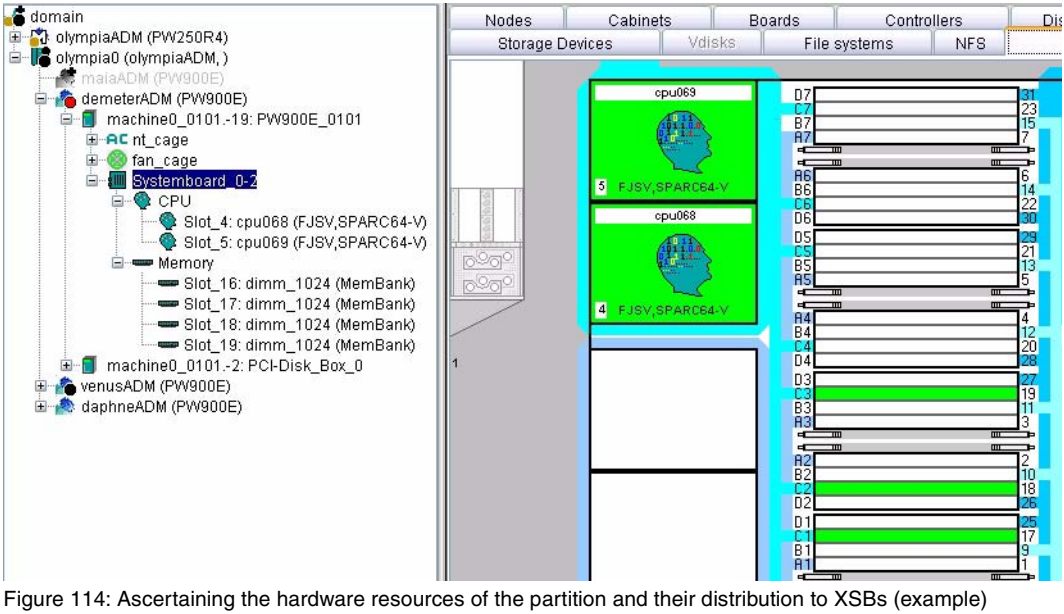


Figure 114: Ascertaining the hardware resources of the partition and their distribution to XSBs (example)

Initiating the DR process

The basic actions *DR-connect* and *DR-disconnect* are always performed in the partition for which they apply, and this independently of whether they are initiated in PRIMEPOWER ServerView within the partition or on the SMC.

DR-connect and *DR-disconnect* are initiated by selecting the relevant XSB (designates the system board) and one of the actions *Connect*, *Disconnect* or *Hot Swap* in the *Systemboards DR* subtab of the *Boards* tab in the *VConfig* application.

- The *Disconnect* action enables *DR-disconnect* to be initiated for an XSB which is currently integrated in or assigned to the selected partition .
- The *Connect* action enables *DR-connect* to be initiated directly for an XSB which is at this time either assigned to the pool of free XSBs or the selected partition.
- The *Hot Swap* action enables *DR-disconnect* to be initiated for preparing the Hot Swap of an XSB (Hot Swap is the name of the process in which a hardware component is added or removed while the system is active). The XSB remains assigned to the partition in this case. If required the intended Hot Swap can be canceled by going to the *Systemboards DR* subtab of the *Boards* tag and selecting first the XSB and then the *Cancel hot swap* action which becomes available.

Important note
In PRIMEPOWER ServerView the DR process is logged in a separate window. Avoid closing this window as this results in the DR process being aborted.
If it is necessary to abort it, a DR process started using PRIMEPOWER ServerView should be aborted with the `drc -abort` command (see the section “Execution of DR, diagnosis and problem handling” on page 313).

In the example below XSB 01-1 (here named *Systemboard_1-1*) is removed immediately (*Disconnect immediatly* option) and not assigned to another partition but to the pool of free XSBs.

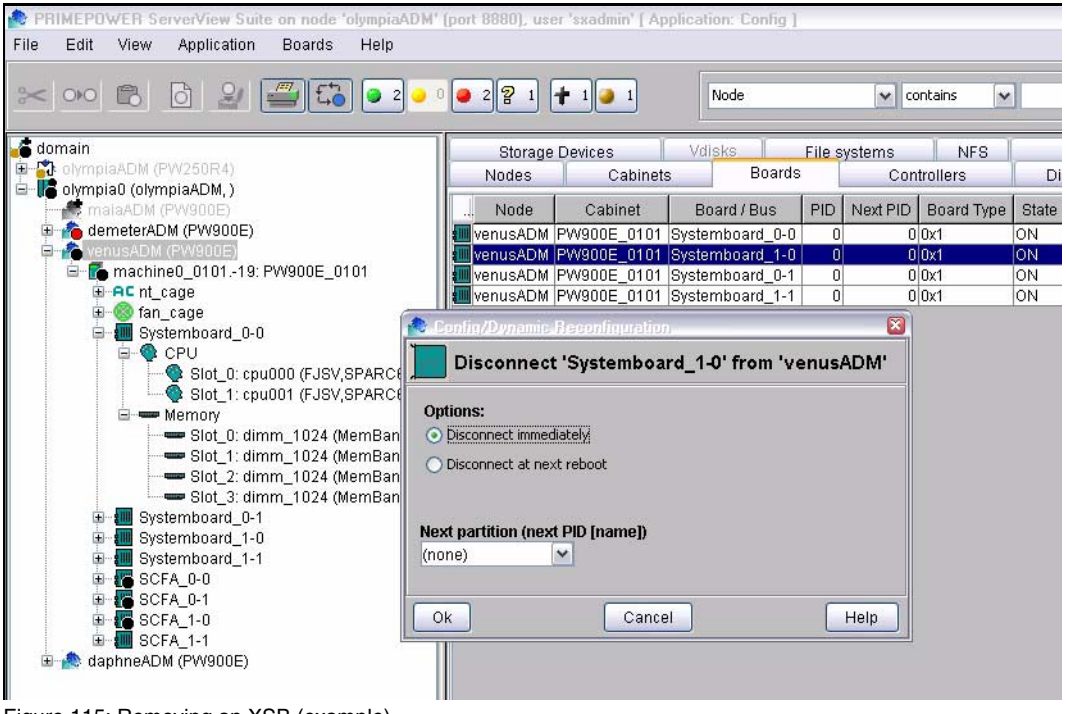


Figure 115: Removing an XSB (example)

Notes

- The *Disconnect at next reboot* option (alternative to the *Disconnect immediatly* option) is the equivalent of the `-reset` parameter in the `drc` command.
- In the *Next partition* list a partition (default: none) can be selected which the XSB is assigned to after it has been removed.
  This is the equivalent of the `-next <Partition ID>` parameter in the `drc -disconnect` command.
- The `drc` command is described in the section “The command interface” on page 308.

In PRIMEPOWER ServerView the *Move* action is the basis for the DR workload distribution application.
The *Move* action enables the sequence of *DR-disconnect* and *DR-connect* to be initiated which is required to shift an XSB to another partition.

- *DR-disconnect* removes the XSB from the partition which releases it and assigns it to the receiving partition.

- *DR-connect* integrates the XSB in this receiving partition.
- The *Move* action is a cross-partition action comprising one of the simple actions *DR-connect* and *DR-disconnect* and is only possible on the SMC in PRIMEPOWER ServerView.

The action is started for the partition which releases the XSB.

Example

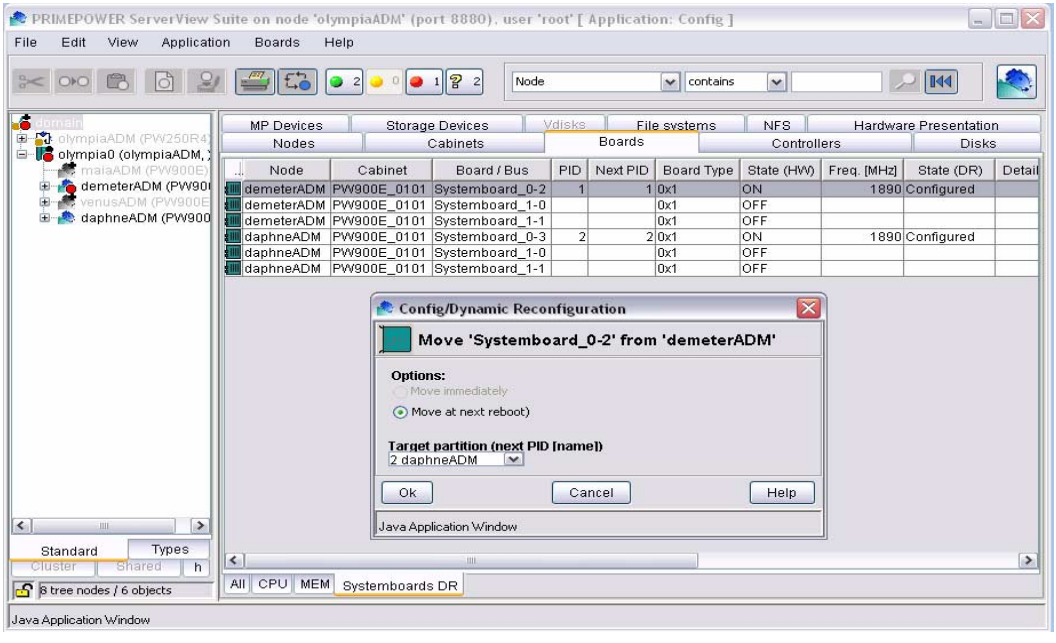

PRIMEPOWER ServerView Suite on node 'olympiaADM' (port 8880), user 'root' [Application: Config]
File Edit View Application Boards Help
Node contains
MP Devices Storage Devices Vdisks File systems NFS Hardware Presentation
Nodes Cabinets Boards Controllers Disks
Node Cabinet Board / Bus PID Next PID Board Type State (HW) Freq. [MHz] State (DR) Detail
demeterADM PW900E_0101 Systemboard_0-2 1 1 0x1 ON 1890 Configured
demeterADM PW900E_0101 Systemboard_1-0 0x1 OFF
demeterADM PW900E_0101 Systemboard_1-1 0x1 OFF
daphneADM PW900E_0101 Systemboard_0-3 2 2 0x1 ON 1890 Configured
daphneADM PW900E_0101 Systemboard_1-0 0x1 OFF
daphneADM PW900E_0101 Systemboard_1-1 0x1 OFF
Config/Dynamic Reconfiguration
Move 'Systemboard_0-2' from 'demeterADM'
Options:
Move immediately
Move at next reboot)
Target partition (next PID [name])
2 daphneADM
Ok Cancel Help
Java Application Window
All CPU MEM Systemboards DR
Standard Types
8 tree nodes / 6 objects
Java Application Window

Figure 116: Shifting an XSB (example)

In the above example XSB 00-1 (here named *Systemboard_0-2*) is removed from the node *demeterADM* (PID 1) and assigned to the node *daphneADM* (PID 2).

The DR action is to take place immediately. The shift could also take place after a reboot, in which case both nodes concerned would have to be rebooted – first *demeterADM* and then *venusADM*.

10.2.2 The command interface

The commands described below can only be executed under the root ID and in the partition(s) concerned.

Information functions – Partitions, system boards and associated resources

1. /opt/FJSVhwr/sbin/drcstat -board [all] -xpar

The `drcstat` command lists the system boards of the machine and their configuration statuses in the partitions (current partition, next partition after a Partition Solaris reboot). If `all` is not specified, only those system boards are listed which are currently assigned to the home partition.

```
# drcstat -board all -xpar
 SB   BN Status (Detail)   PID Next_PID Board_Type CPU(MHz)
 ---- -- ----------------- --- -------- ---------- --------
 00-0  0 Configured         00       00       0x34     1890
 00-1  4 Configured         00       00       0x34     1890
 00-2  8 Configured         01       01       0x34     1890
 00-3 12 Configured         02       02       0x34     1890
 01-0  1 Configured         03       03       0x34     1890
 01-1  5 Disconnected       --       --       0x34     1890
 01-2  9 ---                --       --       ---      ---
 01-3 13 ---                --       --       ---      ---
```

In this example the first 5 XSBs are operating, the first 2 are being used by the partition (with PID) 0 (here named 00), and the next 3 by the partitions 1, 2 and 3 (here named 01, 02, 03). The XSBs are permanently assigned to the partitions, i.e. also after any Solaris reboot as `Next_PID = PID` applies in a ll cases.

For XSB 01-1, which is not operating, no value is assigned to the `Next_PID` setting, i.e. the XSB is in the pool of free XSBs and could be attached to any of the partitions.

XSBs 01-2 and 01-3 do not exist on this server.

2. x2prtpci [-v]

The `x2prtpci` command lists, in compact form, the system boards, PCI bus processors (UPA bridges), PCI cards, ports on the PCI cards, and SCSI devices of the home partition. If the `-v` option is not specified, the list does not include ports and SCSI devices.

The first line in the list has the following format:

```
  (1)   (2)    (3)    (4)
system1(01): 00-0 (80 81) 00-1 (a2) 01-3 (ee)
```

(1) Name of the partition

(2) Partition ID

(3) Name of the system board (or, in XPAR mode, name of the XSB)

(4) IDs of the PCI bus processors which belong to the system board (or XSB in XPAR mode)

The line for a PCI card has the following format:

```
  (1)                    (2)       (3)    (4)  (5)
(PCI#04 at Cabinet#0,SCFA#0)   lpfc    1 /pci@81,4000/fibre-channel@3
```

(1) Number of the PCI slot; if PCIOB, SCFA or I/O-BOX is contained here instead of PCI, the controller is an onboard

(2) I/O cage in which the PCI slot is contained (SCFA = basic I/O board in the system cabinet)

(3) Name of the driver for the controller on the PCI card; it begins with * if no driver is installed; the subsequent text is then a generic controller name

(4) Instance number used by the driver

(5) PCI bus processor ID in the physical path for the controller; the SB to which the PCI card belongs is then obtained from the first output line

Example

```
# x2prtpci -v
Please wait . . . . . .
danteADM(00): 00-0 (80 81) 01-1 (aa) 01-2 (cc cd) 01-3 (ee)
(PCIOB#0 at Cabinet#0,SCFA#0)  hme            0 /pci@80,4000/network@1,1
(SCFA#0 at Cabinet#0)          glm            0 /pci@80,4000/scsi@4
     FUJITSU  MAP3735NC        sd                   t0  d0
     FUJITSU  MAP3735NC        sd                   t1  d0
                               glm            1 /pci@80,4000/scsi@4,1
(PCI#01 at Cabinet#0,SCFA#0)   lpfc           0 /pci@80,4000/fibre-channel@2
(PCI#00 at Cabinet#0,SCFA#0)   lpfc           1 /pci@80,2000/fibre-channel@1
     EMC      SYMMETRIX        sd                   t0  d0   ... d223 (224)
     EMC      SYMMETRIX        sd                   t3  d0   ... d255 (214)
     EMC      SYMMETRIX        sd                   t8  d0   ... d255 (256)
     EMC      SYMMETRIX        sd                   t9  d0   ... d255 (256)
(PCI#03 at Cabinet#0,SCFA#0)   pci_pci        0 /pci@81,4000/pci@2
                               fjqe           0 /pci@81,4000/pci@2/FJSV,pl4b@4
                               fjqe           1 /pci@81,4000/pci@2/FJSV,pl4b@5
                               fjqe           2 /pci@81,4000/pci@2/FJSV,pl4b@6
                               fjqe           3 /pci@81,4000/pci@2/FJSV,pl4b@7
(PCI#02 at Cabinet#0,SCFA#0)   lpfc           2 /pci@81,2000/fibre-channel@1
     EMC      SYMMETRIX        sd                   t0  d0   ... d223 (224)
     EMC      SYMMETRIX        sd                   t3  d0   ... d255 (214)
     EMC      SYMMETRIX        sd                   t8  d0   ... d255 (256)
     EMC      SYMMETRIX        sd                   t9  d0   ... d255 (256)
(PCIOB#1 at Cabinet#0,SCFA#1)  hme            1 /pci@aa,4000/network@1,1
(SCFA#1 at Cabinet#0)          glm            2 /pci@aa,4000/scsi@4
     FUJITSU  MAP3735NC        sd                   t0  d0
     FUJITSU  MAP3735NC        sd                   t1  d0
                               glm            3 /pci@aa,4000/scsi@4,1
(PCI#06 at Cabinet#0,SCFA#1)   SMAWscinex     0 /pci@aa,4000/pci11c8,800@2
(PCI#07 at Cabinet#0,SCFA#1)   SMAWscinex     2 /pci@aa,4000/pci11c8,800@3
(PCI#05 at Cabinet#0,SCFA#1)   lpfc           3 /pci@aa,2000/fibre-channel@1
     EMC      SYMMETRIX        sd                   t12 d48  ... d157 (110)
(PCIOB#0 at Rack#0,IO_BOX#1)   hme            2 /pci@cc,4000/network@1,1
(IO_BOX#1 at Rack#0)           glm            4 /pci@cc,4000/scsi@4
     FUJITSU  MAP3735NC        sd                   t0  d0
     FUJITSU  MAP3735NC        sd                   t1  d0
                               glm            5 /pci@cc,4000/scsi@4,1
(PCI#01 at Rack#0,IO_BOX#1)    lpfc           6 /pci@cc,4000/fibre-channel@2
     EMC      SYMMETRIX        sd                   t13 d48  ... d157 (110)
(PCI#00 at Rack#0,IO_BOX#1)    fjulsa         0 /pci@cc,2000/FJSV,ulsa@1
                               fjulsa         1 /pci@cc,2000/FJSV,ulsa@1,1
(PCI#04 at Rack#0,IO_BOX#1)    lpfc           4 /pci@cd,4000/fibre-channel@2
     IBM      ULTRIUM-TD2      SMAWLsti             t56 d4   ... d7   (  4)
(PCI#03 at Rack#0,IO_BOX#1)    ithps          1 /pci@cd,2000/IntraServer-Ultra160,scsi@1
     IBM      ULTRIUM-TD2      SMAWLsti             t1  d0
     EXABYTE  Exabyte 110L     sgen                 t0  d0
                               ithps          0 /pci@cd,2000/IntraServer-
Ultra160,scsi@1,1
(PCIOB#1 at Rack#0,IO_BOX#1)   hme            3 /pci@ee,4000/network@1,1
(IO_BOX#1 at Rack#0)           glm            8 /pci@ee,4000/scsi@4
     FUJITSU  MAP3735NC        sd                   t0  d0
     FUJITSU  MAP3735NC        sd                   t1  d0
                               glm            9 /pci@ee,4000/scsi@4,1
(PCI#07 at Rack#0,IO_BOX#1)    lpfc           5 /pci@ee,2000/fibre-channel@1
     IBM      ULTRIUM-TD2      SMAWLsti             t22 d3
     IBM      03590E1A         SMAWLsti             t55 d4   ... d7   (  4)
```

3. bs2drstat [sb<SB-Name>]

The `bs2drstat` command lists the BS2000 resources which are lost in the partition due to DR-disconnect of the system board and specifies whether the *DR-disconnect* is possible from the X2000 viewpoint. If the command is called without an argument a menu for selecting the system board is offered.

Example 1

CPU-XSB 01-3 can be released with *DR-disconnect*.

```
# bs2drstat sb01-3
Please wait . . . . . .
------------------------------------------------------------------------------
System board                      : name: 01-3  number: 13  mode: XSB (1/4 PSB)
Processors                        : CPU: 0  IOP: 0  CRYPT: 0  spare: 2
Memory                            : BS2000: 0M  I/O: 0M
BS2000 channels                   : UHPS connector: 0  non-UHPS channel: 0
Network interfaces I/O sys. (name) : none
Disk mirrors (c<ctl>t<tgt>d<lun>)  : none
PowerPath targets (c<ctl>t<tgt>)   : none
BS2000 disks (mnemonic)           : 1500 1501 1502 1503 1504 1505 1506 1510
                                    1511 1512 1513 1514 1515 1516
BS2000 tapes (mnemonic)           : A093 A094 A095 A096 A097 A098 A099 A09A
                                    TH   TI
ZAS-LAN (mnemonic)                : none
BS2000 printers (mnemonic)        : none
=========
DR status
=========
Nothing found that will prevent the disconnection of the system board.
```

Example 2

XSB 01-1 cannot be released with *DR-disconnect* because of the resources it contains – memory, I/O devices of the type UHPS and boot disk.

```
# bs2drstat sb01-1
Please wait . . . . . .
------------------------------------------------------------------------------
System board                      : name: 01-1  number: 5  mode: XSB (1/4 PSB)
Processors                        : CPU: 0  IOP: 0  CRYPT: 0  spare: 2
Memory                            : BS2000: 0M  I/O: 4096M
BS2000 channels                   : UHPS connector: 2  non-UHPS channel: 26
Network interfaces I/O sys. (name) : none
Disk mirrors (c<ctl>t<tgt>d<lun>)  : c1t0d0
PowerPath targets (c<ctl>t<tgt>)   : c13t12
BS2000 disks (mnemonic)           : 1110 1111 1112 1113 1114 1115 1116
BS2000 tapes (mnemonic)           : none
ZAS-LAN (mnemonic)                : none
BS2000 printers (mnemonic)        : none
=========
DR status
=========
 1) removing of memory not supported
 2) A system board with UHPS connectors and/or channels cannot be removed.
 3) Current bootdisk is affected but there is no other mirrordisk.
The disconnection of the system board will fail.
```

Action functions – Initiating the DR process

/opt/FJSVhwr/sbin/drc

Depending on the parameters specified, the `drc` command initiates *DR-connect* or *DR-disconnect* for the specified XSB. The following parameters are supported:

```
/opt/FJSVhwr/sbin/drc -connect sb<SB-Name> [-reset]
/opt/FJSVhwr/sbin/drc -disconnect sb<SB-Name> [-reset]
/opt/FJSVhwr/sbin/drc -disconnect sb<SB-Name> -next <Partition ID> [-reset]
/opt/FJSVhwr/sbin/drc -disconnect sb<SB-Name> -keep
```

DR-connect is accepted only for an XSB which is assigned either to the home partition or to the pool of free XSBs.

DR-disconnect is accepted only for an XSB which is either integrated in the home partition or assigned to it.

Which partition an XSB is assigned to after *DR-disconnect* is decided by the `-keep` and `-next` options:

– If neither of the options is specified, the XSB is assigned to the pool of free XSBs.

– When `-keep` is specified the XSB remains assigned to the home partition. *DR-disconnect* with the `-keep` temporarily disconnects an XSB so that the Hot Swap of the physical system board reserved by the XSB can take place.

CAUTION!
Before the XSB can be reconnected to the partition using *DR-connect* the Hot Swap of the physical system board must be performed or the keep status must be reset with the following SMC command:
`/opt/FJSVcsl/bin/drkeepcancel <Server-Name> <XSB-Name>`

– When `-next` is specified the XSB is assigned to the partition with the specified partition ID.

An XSB which is assigned to a partition is automatically integrated into this partition the next time Solaris is rebooted.

The `-reset` parameter controls immediate reconfiguration of reconfiguration via a reboot:

– If the `-reset` parameter is not specified, the reconfiguration process is initiated immediately.

– If the `-reset` parameter is specified, the reconfiguration process is planned for the next time Solaris is rebooted.
A drc command with the `-disconnect` and `-reset` options is canceled again and reversed by a later command for the same XSB with the `-connect` and `-reset` options.

Note

Reconfiguration via a reboot can also be performed using the Machine Administration Menu on the SMC.

10.2.3 Execution of DR, diagnosis and problem handling

Execution and errors with DR-connect

A normal DR-connect run consists of the following phases:

– SB self-test phase (only if the system board is in the SB pool)
– checkadd
– preadd
– Kernel phase (Solaris)
– postadd

The DR-connect actions for BS2000 or VM2000 are part of the postadd phase.

Execution and errors with DR-disconnect

A normal DR-disconnect run consists of the following phases:

– checkremove
– preremove
– Kernel phase (Solaris)
– postremove
– SB self-test phase
(exception: the system board is returned to the SB pool)

The DR-disconnect actions for BS2000 or VM2000 are part of the preremove phase.

Dialog with the user

In a BS2000 partition a dialog with the user takes place when the -keep option is specified. The following question must be answered here:

```
option is only used for system board hotswap operation. Continue ? [YES]/[NO]
```

Trailer run and delays

After the phases described above have been completed a trailer run takes place in the background in which the information about the DR process is distributed over the entire server.

As of the postadd phase in the trailer run probing actions take place for all the partition's ports.

A subsequent DR action is accepted, but is performed with a delay, i.e. after the trailer run has finished. Information functions such as `drcstat` are also affected by this delay.

Logging DR run

The following logging files are available for the (tele)service(:

– `/var/opt/FJSVdr/log/dr_op/[0-9]`

  Solaris DR logging files which are created once each time `drc -connect` or `-drc disconnect` is called. The 10 files are overwritten cyclically.

– `$SMAWL_LOG/drs/[0-9]` (wtih `SMAWL_LOG=/var/opt/SMAW/X2000/log`)

  X2000 DR logging files which are created once each time `drc -connect` or `-drc disconnect` is called. The 10 files are overwritten cyclically.

– `$SMAWL_LOG/drstat/[0-9]` (with `SMAWL_LOG=/var/opt/SMAW/X2000/log`)

  bs2drstat logging files which are created once each time `bs2drstat` is called. The 10 files are overwritten cyclically.

Canceling the DR lock

In special situations (e.g. in the event of an abnormal shutdown procedure or SETS) BS2000/VM2000 sets a DR lock so that a SLED can be executed after shutdown.

If the lock is set, DR aborts in the preadd/preremove phase with the following message:

```
Current BS2000 state does not allow DR
```

If for example a SLED is to be executed, the lock can be canceled with the following command:

```
$SMAWL_BIN/bs2dr -reset  (SMAWL_BIN=/opt/SMAW/X2000/bin)
```

Aborting DR

A DR process can be aborted by the user with the following command:

```
/opt/FJSVhwr/sbin/drc -abort
```

Important notes
You should avoid aborting the `drc` command by a signal (`kill`, termination of the terminal connection, etc.) since it can leave the system in a status which can only be canceled using `POWER-OFF/ON`.
Entering Ctrl+C aborts the `drc` command, but can have the same negative effects as other signals.

10.2.4 DR runs in BS2000

DR processes are always initiated and executed at Solaris level.

In BS2000/VM2000 no measures or actions are needed; the CPUs are automatically disconnected or connected in accordance with the licenses.

The start and end and all BS2000 reconfiguration actions of a DR run are reported on the console in BS2000 or VM2000.

The runs at BS2000/VM2000 level are described below on the basis of a CONSLOG listing (of a VM2000 monitor system) which contains a *DR-Connect*:

```
<R % DRT-000.183247  %  MCS1048 SYSTEM COMPONENT 'ETMDR' REQUESTS CLUSTER RECOVERY LOCK ————————  (1)
<R % DRT-000.183247  %  MCS1002 GLOBAL MSCF CONFIGURATION PARAMETER 'RECOVERY-START' CHANGED FROM
'*AUTOMATIC' TO 'LOCKED' ——————————————————————————————————————————————————————————————————————  (2)
<* % DRT-000.183247  %  ETMDR01 DYNAMIC RECONFIGURATION WITH FUNCTION 'ADD' STARTED ——————————————  (3)
<9 %VM2G-000.183247  %  VMS4551 DYNAMIC RECONFIGURATION WITH FUNCTION 'ADD' STARTED ——————————————  (4)
<9 %VM2G-000.183352  %  VMS4553 CPU 04 SET ONLINE BY DR ——————————————————————————————————————————  (5)
<9 %VM2M-000.183352  %  VMS4044 CPU 04 ATTACHED ——————————————————————————————————————————————————  (6)
<9 %VM2G-000.183352  %  VMS4620 IMPLICIT ATTACH-DEVICE FOR VIRTUAL CPUS ON VIRTUAL MACHINE
(1,MONITOR1) STARTED ——————————————————————————————————————————————————————————————————————————  (7)
<9 %VM2G-000.183356  %  VMS2023 CPU 04 OF VIRTUAL MACHINE (1,MONITOR1) STARTED ————————————————————  (8)
<* % MSG-000.183356  %  ETMRK18 CPU 04 ATTACHED ——————————————————————————————————————————————————  (9)
<9 %VM2G-000.183359  %  VMS4552 DYNAMIC RECONFIGURATION WITH FUNCTION 'ADD' FINISHED ——————————————  (10)
<* % DRT-000.183359  %  ETMDR02 DYNAMIC RECONFIGURATION WITH FUNCTION 'ADD' FINISHED ——————————————  (11)
<R % DRT-000.183359  %  MCS1049 SYSTEM COMPONENT 'ETMDR' RELEASES CLUSTER RECOVERY LOCK ————————  (12)
<R % DRT-000.183359  %  MCS1002 GLOBAL MSCF CONFIGURATION PARAMETER 'RECOVERY-START' CHANGED FROM
'LOCKED' TO '*AUTOMATIC' ——————————————————————————————————————————————————————————————————————  (13)
```

In an MSCF network the DR process is covered by the following measures by MSCF to ensure consistency

Lines 1, 2: MSCF monitoring is placed in the locked status by the request for a lock by the BS2000 DR component (here from VM1).

Lines 12,13: MSCF monitoring (in VM1) is placed in its original status by releasing the lock.

The following DR process takes place within this framework:

Line 3: BS2000 (from VM1) reports the start of the DR process.

Line 4: VM2000 reports the start of the DR process.

Lines 5 and 6: VM2000 reports the implicit automatic attachment (online and ATTACH) of the real CPU 4.

Lines 7 and 8: VM2000 reports the implicit start of the virtual CPU 4 in VM1.

Line 9: BS2000 (from VM1) reports the implicit automatic attachment (ATTACH) of the virtual CPU 4.

Line 10: VM2000 reports the end of the DR process.

Line 11: BS2000 (from VM1) reports the end of the DR process.

Further information on BS2000

- During DR CPUs are attached and detached automatically and implicitly provided the existing licenses permit this.
- CPUs which are licensed in BS2000 but are located on XSBs which are not attached at a point in time are nevertheless reported by X2000 and displayed in BS2000 with the `DET(EX)/OFF` status. This applies both for normal and “extra” CPUs.
  Explicit attachment of these CPUs is rejected with the message
  `ETMRK3O CPU (&OO) UNEXPECTED CONFIGURATION STATE: FOREIGN`
  until an XSB is attached using DR.
  After *DR-connect* “normal” CPUs are implicitly attached in BS2000.
  “Extra” CPUs must be attached explicitly using the following command (see “Commands, Volumes 1 - 5” [11]):
  `/ATTACH-DEVICE UNIT=*EXTRA-CPU(...)`
- Before *DR-disconnect* it may be necessary to detach the “extra” CPUs employed explicitly with the following command:
  `/DETACH-DEVICE UNIT=*EXTRA-CPU(*ALL)`
  Otherwise BS2000 rejects the DR request with the console message `ETMDRO5`.
- Attached memory is automatically put into operation as main memory in the accordance with the system limit for the model series and cannot be released again in ongoing operation. *DR-disconnect* is rejected, the memory can be released again through a reboot.
- Channel devices connected via UHPS (Universal Hot-Plug System) are not activated automatically while operation is in progress but only when a reboot takes place.

  DR-disconnect is rejected for channel devices connected via UHPS which have been put into operation; they are released again only when a reboot takes place.
- BS2000 devices (disks) are generally configured as multipath devices using both system boards, which means that after DR at least one path remains for each device. PowerPath automatically switches to the remaining paths.
- Tape devices connected via FC can always only be reached via one path. The archive system which monitors them (e.g. CentricStor) should be connected on a multipath basis via both system boards by attaching subsets of the devices via different paths. As a result all tape devices are accessible after Dynamic Reconfiguration provided there is a path open to the archive system.

- If a DR action is rejected by BS2000/VM2000, all configuration changes made up to then are automatically undone.
  Exception:
  Owing to the length of time it takes separate mirror disks are not resynchronized.
- If during a *DR-disconnect* action im BS2000 a ZASLAN device is deactivated for which automatic reactivation has been enabled (SLOW-POLL=*ON), this results in constant attempts to reactivate the device. In this case entries in the hardware error logging file are also generated. Consequently reactivation should be disabled before *DR-disconnect* is executed (e.g. with `/MODIFY-LINE ...,SLOW-POLL=*OFF` or with `/BCDAC LINE=...`)

Further information on VM2000

- The start of a DR process is accepted by VM2000 only if it is accepted within a certain time by all active guest systems which support DR.
- Pure CPU-XSBs are started up and shut down automatically by VM2000. CPUs which are licensed in VM2000 but are located on XSBs which are not attached at a point in time are displayed as having the `OFF` status in VM2000. This applies both for normal and “extra” CPUs.
  Explicit attachment of these CPUs is rejected with the following message until an XSB is attached using DR:
  ```
  VMS4152 CPU (&00) IS OFFLINE. COMMAND REJECTED
  ```
  In the event of *DR-connect* “normal” CPUs are implicitly attached by VM2000. “Extra” CPUs must, if required, be attached explicitly by the VM2000 administrator using the following command (see “Virtual Machine System” manual [14]):
  ```
  /ATTACH-VM-RESOURCES UNIT=*EXTRA-CPU(...)
  ```
  In the event of *DR-disconnect* no “extra” CPU may be attached at this time, i.e. “extra” CPUs must be explicitly detached beforehand by the VM2000 administrator using the following command:
  ```
  /DETACH-VM-RESOURCES UNIT=*EXTRA-CPU(...)
  ```
  Otherwise VM2000 rejects the DR request with the console message `VMS4555`.
- Use of the CPUs added is configuration-dependent and flexible:
  The new CPU performance is initially assigned to the existing VMs in accordance with the `CPU-QUOTA` set. However, it is also possible to specify, for example, that only one (new) VM should (primarily) profit from the new CPU performance. Details on planning the distribution of the CPU performance to the VMs are provided in the manual “Virtual Machine System” [14].

- Virtual CPUs are implicitly reconfigured by VM2000 when Dynamic Reconfiguration (attachment or detachment of real CPUs) takes place. If for a VM the number of active virtual CPUs has become greater than the number of attached real CPUs in the associated CPU pools, excess virtual CPUs are implicitly detached. By the same token detached virtual CPUs are implicitly attached if the number of attached real CPUs in the CPU pool has been increased by DR. Details on the number of attached real and virtual CPUs in the CPU pool are provided in the manual “Virtual Machine System” [14].
- If an XSB is also equipped with memory or I/O devices and if these are to be used, the VM2000 administrator must perform the following actions after these have been put into operation with DR:
  - Memory is not automatically distributed to the VMs.
    The VM2000 administrator must therefore distribute the memory to the VMs after DR using the commands /EXTEND-VM-MEMORY, /MOVE-VM, /CREATE-VM.
  - I/O devices
    New devices added with *DR-connect* are not assigned to the VMs in the context of DR. They must be assigned explicitly to the guest systems by the VM2000 administrator (/ADD-VM-DEVICE command) or be supplied with the privilege required for implicit assignment (ASSIGN-BY-GUEST). The devices must then be attached quite normally in the relevant guest systems (ATTACH).
- An XSB with usable memory and/or UHPS devices which have been put into operation is released only when Solaris is rebooted.
- An XSB with exclusive I/O devices (but without any memory or UHPS devices) can also be released during ongoing operation if the BS2000 devices satisfy one of the following conditions:
  - The device is not assigned.
  - The device is assigned to at most one VM (i.e. is not “shared”), and it is already DETACHED in the guest system concerned, or it can be detached implicitly in the context of the DR request.

Note

After a DR action the RUN files for configuring the VMs may need to be adjusted.

Further information on MSCF

As of Version 15.0 (component part of OSD/XC V2.0) HIPLEX MSCF automatically supports Dynamic Reconfiguration. This excludes the possibility of inadvertent failure detection (caused by the absence of the sign-of-life signals during DR). In terms of MSCF DR runs as follows:

- Start of Dynamic Reconfiguration
  The system requests the “Cluster Recovery Lock” from MSCF (console message MCS1048). When the lock is received the local system is placed in the RECOVERY-START=*LOCKED status (console message MCS1002).
- End of Dynamic Reconfiguration
  The system releases the “Cluster Recovery Lock” (console message MCS1049). When the lock is released the local system is returned to its original status (e.g. RECOVERY-START=*AUTOMATIC) (console message MCS1002).
- The following must be taken into consideration on partner systems in the MSCF network:
  - At the start of DR console message MCS1040 reports the monitoring status LOCKED for the system involved. This status is also displayed by the /SHOW-MSCF-CONFIGURATION command with an “L” in the RECOVERY-START column.
  - At the end of Dynamic Reconfiguration console message MCS1040 reports the original monitoring status for the system involved.

Notes

- While the “Cluster Recovery Lock” is retained on one or more systems in the MSCF network, automatic failure handling is locked for these systems.
- In special situation (e.g. during a CPU reconfiguration of reconfiguration of the global storage) MSCF rejects the DR request with console message ETMDR04.

10.2.5 Settings relevant to DR

The settings relevant to DR and hardware requirements which are described in the following are set ex works or automatically by the X2000 carrier system and need not be configured by the customer.

This description is therefore only intended for information purposes and is restricted to the main aspects.

OBP settings of the system board relevant to DR

The following OBP settings apply per partition. If a system board is also used in another partition, the required setting for this XSB must also be made there.

1. configuration-policy

```
eeprom configuration-policy["component / board"]
```

This command lists the value of the specified OBP parameter or assigns one of the two values to the parameter. The value applies for all system boards/XSBs of the partition.

– `configuration-policy=component` means that if a hardware fault occurs only the faulty component is taken out of service.

– `configuration-policy=board` means that if a hardware fault occurs the entire XSB is taken out of service and is thus available to be removed so that is can be serviced or replaced.

2. no-obp-sb, no-mem-sb, no-io-sb

```
eeprom { no-obp-sb | no-mem-sb | no-io-sb } ["<SB-Name> [<SB-Name> …]"]
```

For an OBP setting this command lists the XSB names for which this setting applies or assigns a list of XSB names to it. The value of the upper OBP parameters is the list of XSBs with the OBP setting of the same name. If the name of an XSB is not contained, the setting does not apply for this XSB.

Each partition has its own OBP settings.

Any modification to the upper OBP settings fir an XSB will take effect with the next *DR-connect* for the XSB in the partition or after the next Solaris reboot in the partition.

To make the memory of a system board unusable, the system board must also be assigned the setting `no-mem-sb`. The setting `no-mem-sb` is effective only in conjunction with the setting `no-obp-sb`.

To make the I/O ports of an XSB unusable, the XSB must be assigned the setting `no-io-sb`.

Examples

1. Specifying a setting for 2 XSBs:

   ```
   eeprom no-mem-sb="01-1 01-2"
   ```

2. Resetting the setting for XSB 01-1:

   ```
   eeprom no-mem-sb="01-2"
   ```

   (The OBP parameter is supplied with a value from the Rest list.)

3. XSB 01-2 becomes the CPU-XSB by specifying all 3 settings:

   ```
   eeprom no-mem-sb="01-2"
   eeprom no-obp-sb="01-2"
   eeprom no-io-sb="01-2"
   ```

The OBP settings `no-obp-sb`, `no-mem-sb` and `no-io-sb` can also be specified in the *VConfig* application of PRIMEPOWER ServerView:

- first mark the relevant system board in the *Systemboards DR* subtab of the *Boards* tab
- and right-click on the *Modify* action

The settings in PRIMEPOWER ServerView correspond to the OBP settings and command parameters as follows:

Settings in the *Systemboards DR* tab	**OBP settings / Command parameters**
For Lock for Kernel Code: Yes	`no-obp-sb`: The list contains the XSB name
I/O deactivation: Yes	`no-io-sb`: The list contains the XSB name
Memory deactivation: Yes	`no-mem-sb`: The list contains the XSB name

Table 12: Settings in PRIMEPOWER ServerView and corresponding OBP settings

In the following example *After reboot* is set to *Off* for XSB 01-1 (here named *Systemboard_1-1*) so that the XSB is not put into operation the next time Solaris is booted.

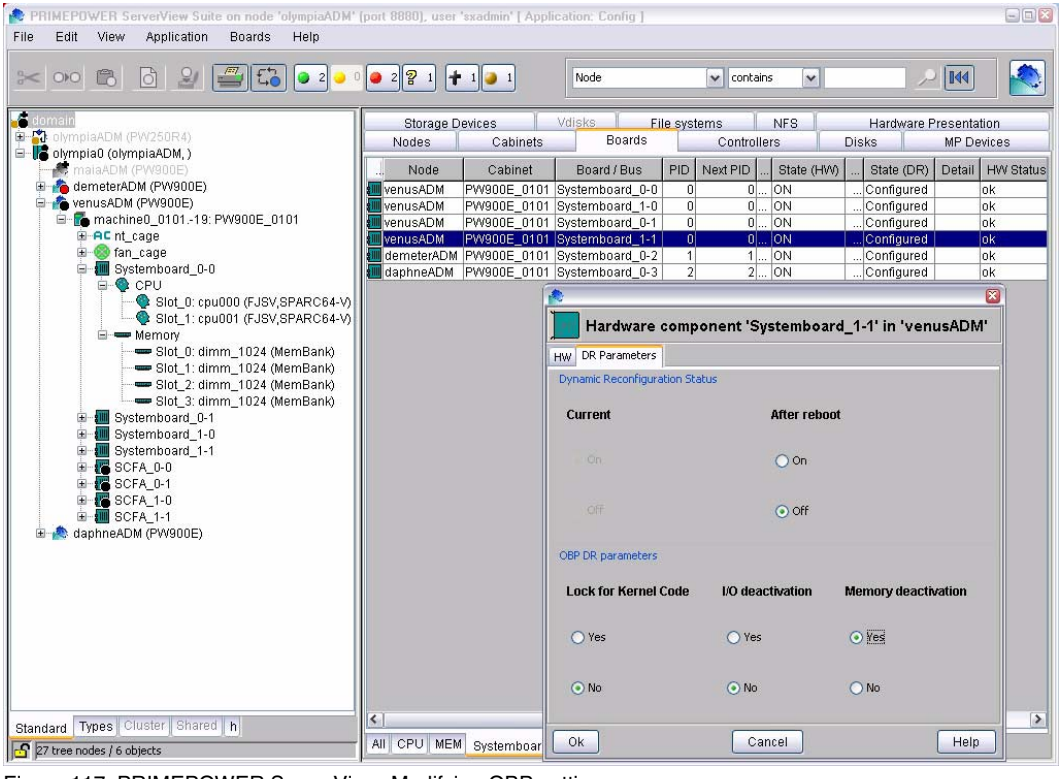


Figure 117: PRIMEPOWER ServerView: Modifying OBP settings

Further settings relevant to DR

- The system boards may not be operated in (Memory) Interleave Mode. If necessary, this can be set via the *Machine Administration Menu* on the SMC of the SX server.
- The following must be set in the `/etc/system` file:

  ```
  set kernel_cage_enable=1
  ```

  With this setting Solaris attempts to create the kernel memory on just one XSB. This is always possible for BS2000 partitions in which X2000/Solaris only requires 2 GB of memory.

11 Solaris: system administration

11.1 X2000 partition

11.1.1 System settings

- After calling PRIMEPOWER-ServerView select the *VConfig* application.
- Select the required computer in the object table.
- Select *Modify*.

A window in which you can define the system settings is displayed.

Example

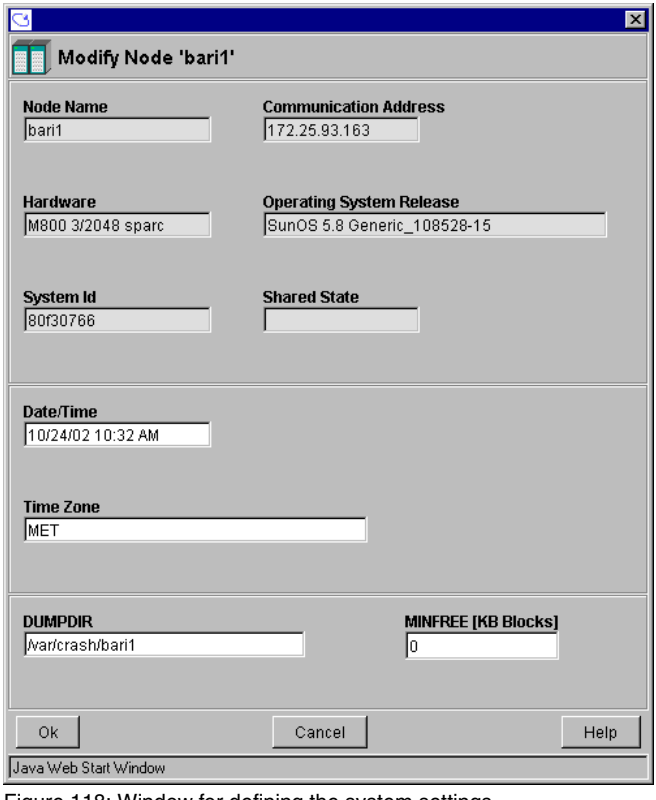


Figure 118: Window for defining the system settings

You can make the following system settings:

- Date/time
- Time zone
- Directory for system memory dumps
- Minimum number of free blocks present in the DUMPDIR directory

11.1.2 Locale parameters

- ► After calling PRIMEPOWER-ServerView select the *VConfig* application.
- ► Select the required computer in the object table.
- ► Select *Modify Locale Parameters*.

  A window in which you can define the locale parameters is displayed.

  Example

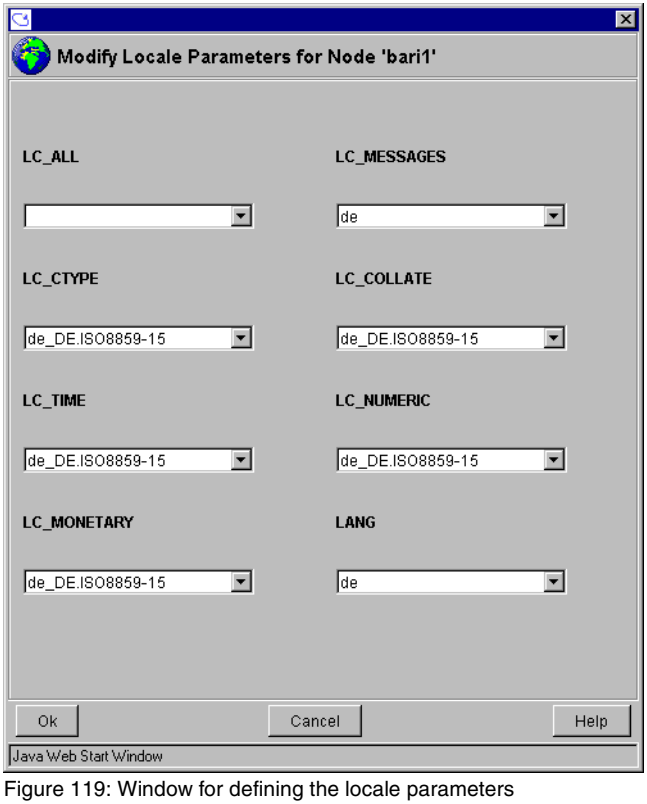


Figure 119: Window for defining the locale parameters

The parameters indicate:

- Environment variable for all boxes
- Format and content of error messages
- Character classes including conversion from lowercase to uppercase and vice versa
- Sort order for characters
- Date and time format
- Number notation

– Currency notation
– System language

In X2000, only German (de_DE.ISO8859-15) and English (en_US.ISO8859-15) are permitted as languages. The only permitted values in LC_MESSAGES are de (for German) and C (for English) and the only permitted values in LANG are de (for German) and en_US (for English).

11.1.3 Recurrent tasks

You are able to define tasks which have to be performed with root authorization regularly at a specified interval.
A task can be a:

– command
– shell procedure
– executable program

► After calling PRIMEPOWER-ServerView select the *Tasks* application.

► Select *Create* (pull-down menu only).

A window in which you can define the tasks is displayed.

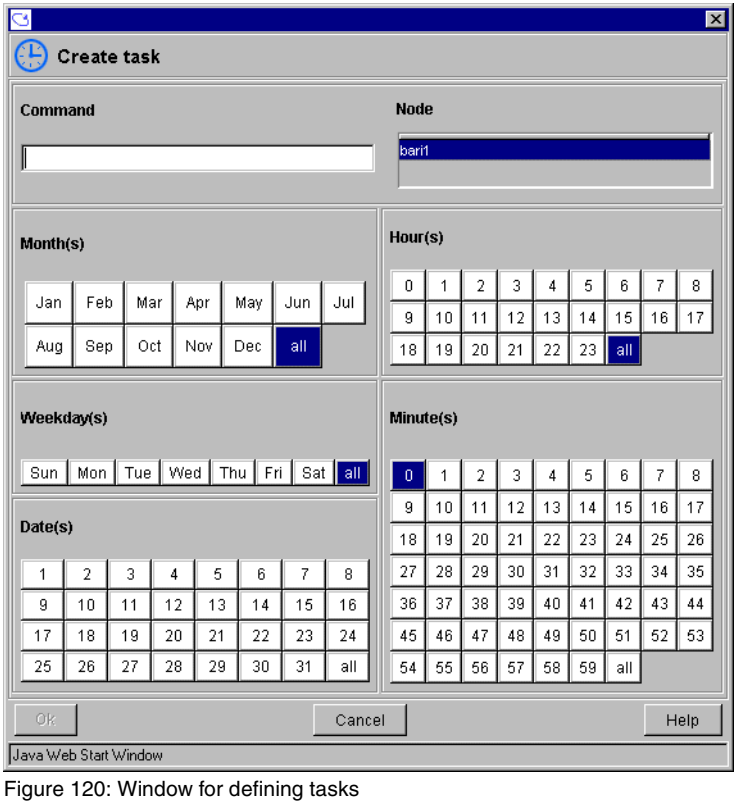


Figure 120: Window for defining tasks

► Enter the command, date and time. Now click *OK*.

11.1.4 User and group administration

You can use this function to administer all the users and groups within the administrative domain.

Call

- After calling PRIMEPOWER-ServerView select the *Users* application.

Tabs

The users and groups are subdivided into three categories which are selected and displayed when you click on the corresponding tab or subtab:

- Users

  Subtab:
  – All
  – Local
  – NIS+

- Group

  Subtab:
  – All
  – Local
  – NIS+

- NIS+ Groups

  This function is available only in administrative domains on computers equipped with NIS.

Menu functions

The functions can be called from the menu bar or from the drop-down menu.

General functions:
– Create
– Modify
– Delete

Specific functions:
– Show login
– Change password

> **i** The passwords for the BS2000 user IDs can also be modified via the X2000 user interface (see section “Functions” on page 211).

11.2 Solaris partition

On partionable systems you can create Solaris-only partitions alongside BS2000 partitions. The Solaris operating system developed by SUN Microsystems Inc. (http://www.sun.com/Solaris) is available in full in the Solaris partition. The Solaris functions and their operation are described in the original documentation from Sun (http://www.sun.com/documentation).

The PRIMEPOWER ServerView graphical user interface from Fujitsu Siemens Computers is available for the administration of the Solaris partition. This is described in the manual "PRIMEPOWER ServerView Suite V2.2 - System Administration within a Domain" [5].

In addition, Fujitsu Siemens Computers provides other functions together with the corresponding documentation for Solaris, for example:

- Dynamic Reconfiguration – Introduction to the Procedure [25]
- Dynamic Reconfiguration User's Guide [26]
- Partition Operation Guide [27]
- Solaris System Diagnostics [28]
- Enhanced Server Capacity on Demand ESCoD [29]
- EventAdmin Enhanced Event Management [30]

11.3 PRIMEPOWER ServerView Suite application “Tools”

The functions “system disk mirror” (Mirror), “configuration data backup” (CSR) and “physical system disk backup” (PSR) have been removed from the PRIMEPOWER ServerView Suite application *Bs2Devices* for X2000 V2.5 and higher. They can now be found in the independent PRIMEPOWER ServerView Suite application *Tools* which can be accessed by selecting the “Tools” start button. The operation of these functions under the two locations is identical.

System environment

Tools is supported on:

- BS2000 partitions (SX servers with SMC).
- SX server entry-level models.
- Solaris systems (SMC, Solaris-Partition, Solaris-Server).

Incorporation in PRIMEPOWER ServerView

The application *Tools* can be called as a module in PRIMEPOWER ServerView Suite and is started using the “Tools” start button:

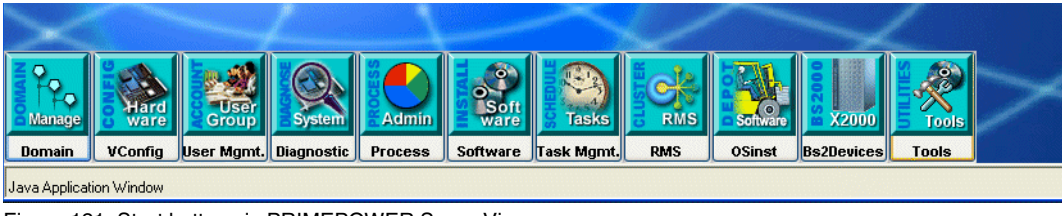


Figure 121: Start buttons in PRIMEPOWER ServerView

Tools displays a “Tools” tab in which the statuses of the functions *Mirror*, *CSR* and *PSR* are indicated:

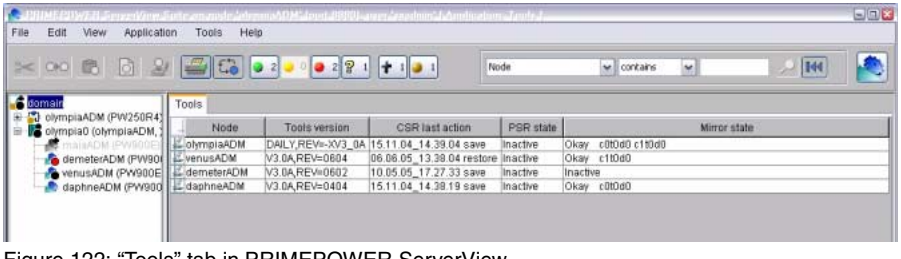


Figure 122: “Tools” tab in PRIMEPOWER ServerView

The node name is given in the first column.

The column “CSR last action” shows the date and type (save/restore) of the last CSR action executed. If nothing has been done there are no previous actions and the column therefore shows “-----”.

The column “PSR status” shows the current status of the PSR. If no PSR is running the status is “inactive”. If a PSR is running the status is “active”.

The column “Mirror status” shows the current status of the mirror with a list of the mirrored disks:

Inactive	No mirror has been activated.
Okay	The mirror is active.
Error	An error condition has occurred.
Resync	The data on a newly incorporated disk are currently being updated.

Clicking “Tools” in the menu list of the PRIMEPOWER ServerView opens a drop-down menu from where you can start the functions *Mirror*, *CSR* and *PSR*:

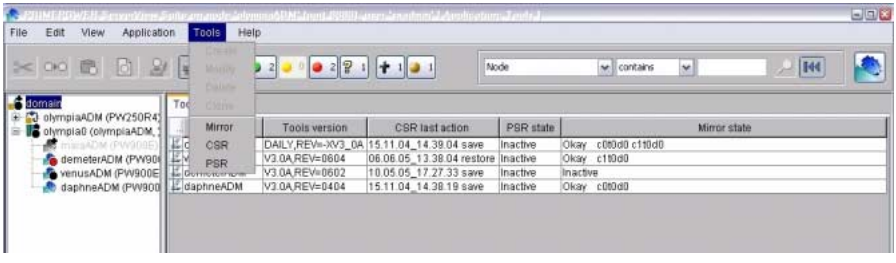


Figure 123: Starting the functions Mirror, CSR and PSR from the drop-down menu

Mirror

1 to 3 disks can be included in the mirror. The disks can be switched to standby or removed completely from the mirror. An existing mirror is supported. To operate the mirror, refer to the on-line help and the section “Mirroring of internal disks in X2000” on page 224.

CSR

CSR backs up system-relevant files to a file or to a tape from which they can be read. The operation of the CSR is described in the on-line help.

PSR

The PSR physically backs up the entire system disk or individual slices. It can be operated on-line and off-line. The operation of the on-line PSR is described in the on-line help; operation of the off-line PSR is described in the section “Offline PSR” on page 274.

12 What if ...

This chapter describes what to do if a fault occurs at the system unit. It helps you to detect faults, identify their causes and, in some cases, to eliminate such malfunctions immediately. In the case of faults that can only be rectified by service staff, you can perform a preliminary diagnosis and then contact the service staff for further information.

Depending on the response of the service staff, you may be able to resume system operation.

The following aids for solving problems are described below:

- Self-Loading Emergency Dump - SLED
- sx.diag command (see page 336)
- Create an IOH/IOS dump (see page 337)
- Create X2000 diagnostic documents (see page 338)

12.1 Self-Loading Emergency Dump - SLED

If an error occurs then a self-loading emergency dump of the system unit saves the processor information present in RAM for subsequent diagnostic operations. The BS2000 program `SLED` saves the error information to the hard disk or to tape for subsequent evaluation by the service staff. During this process, an IOH dump and an IOS dump are also created (for further information, see page 171).

The self-loading emergency dump can be performed automatically if the BS2000 operating system has been suitably prepared (see the “BS2000/OSD-BC Introductory Guide to Systems Support” [12]).

The self-loading emergency dump is performed once the `dipl` command has been issued. The message `NSD3000` asks you to specify the `SLED` output device. The diagnostic file (SLEDFILE) that is created contains all the data which is required for subsequent evaluation by the service staff.

Following a self-loading emergency dump, the system unit should generally be re-initialized by means of an `ipl`.

12.2 sx.diag command

You can use this command to generate a Solaris system dump or to activate or deactivate devices.

Command call

This command is issued in the EVENT screen (see section “EVENT mode” on page 191):

```
sx.diag <parameter>
```

Call formats

```
sx.diag
```

No action is performed The possible input values are output.

```
sx.diag sinixdump
```

A Solaris system crash is immediately initiated and a dump is generated.

CAUTION!
Only issue this command in exceptional cases. It is possible that file systems will be destroyed the next time Solaris is started.

```
sx.diag kdump
```

A `prkdump` is written to the directory `/var/opt/SMAW/X2000/diag`.

```
sx.diag sinixdet
```

All bus devices are disabled.

CAUTION!
If you issue this command while BS2000 is running, there is a risk that BS2000 will crash. It is usually better to disable a single device using the next command (e.g. a specific tape device).

```
sx.diag sinixdet <chn> <unit>
```

The bus device with this chn-no./unit-no. is deactivated. In the case of a dual device (with KVP/LAN), both devices are deactivated. A corresponding message is output.

The chn/unit-no. must be entered in hexadecimal form.
Example: `sx.diag sinixdet 0 03`

`sx.diag sinixatt`

An attempt is made to deactivate all the bus devices.

CAUTION!
Since all the devices have already been deactivated, there is a risk that BS2000 will crash.

`sx.diag sinixatt <chn> <unit>`

The device with this chn-no./unit-no. is activated. In the case of a dual device (with KVP/LAN), both devices are activated. A corresponding message is output.

The chn/unit-no. must be entered in hexadecimal form.
Example: `sx.diag sinixatt 0 3d`

12.3 Create X2000 diagnostic documents

You can use the `save_diag` or `sx.save_diag` command to create diagnostic documents and save these to a file. The most important X2000 data is written to a compressed file.

Command call

under root: `/opt/SMAW/X2000/bin/save_diag`
under EVENT: `sx.save_diag`

Call formats

`save_diag`

The diagnostic files are saved to one of the directories `/var/opt/SMAW/X2000/SAVE_DIAG[0-9]`.

Every time you call `save_diag`, a new directory is created. A maximum of 10 directories can be created. After this, you must delete a directory before creating another.

`save_diag remove <number>`

The directory named `SAVE_DIAG<number>` is deleted.

`save_diag show`

The save files are output sorted by date.

12.4 Create an IOH/IOS dump

If an error occurs at a BS2000 device then an IOH or IOS dump can be generated. This is described on page 172 (“iohdump – dump IOH memory” and “iosdump – dump IOS memory”).

13 X2000 messages

13.1 KVP messages

The messages issued by the console distribution program (KVP) in UNIX mode begin with the message code KVP.

KVP0000 7.500 KVP VERSION (&00) INITIALISED ON (&01) AT (&02)

&00 = KVP version number, &01 = Date, &02 = Time

KVP0001 KVP PARAMETER FILE ERROR

Meaning
The KVP parameter file kvpparam contains a syntax error, the file no longer exists or the system has no further available storage space.

1. On starting up KVP:

   If the file is present and sufficient storage space is available, the file is renamed to /etc/opt/SMAW/X2000/kvpparam.defect. A new parameter file with the default parameter content is then written and used by KVP.

2. When a new KVP parameter file is activated:

   KVP continues to use the old parameter records.

Response

1. Rename the file kvpparam.defect to kvpparam.<system-designation> and correct the defective entry in the file or modify the new file kvpparam.<system-designation> using the KVP configuration.
   To do this it is necessary to rewrite the logging options and all the records.

   You must then activate the new configuration.

2. Correct the defective entry in the file. Then activate the corrected configuration.

KVP0002 NEW KVP PARAMETER FILE ACTIVATED

KVP0005 CURRENT TRANSLATION TABLES: (&00)

&00 = Designation of the line code or the conversion tables

Meaning
The BS2000 console messages are converted from EBCDIC and ASCII and vice versa on the basis of the specified standards. The default setting is Euro/International ISO 8859-1 (ASCII) to BS2000 EBCDIC.DF.04-1 and vice versa.

KVP0006 LANGUAGE TRANSLATION FILE ERROR (&00)

&00 = Designation of the line code or the conversion table

Meaning
The international character translation file `inter.atoe` or `inter.etoa` is not present and the system has no further available storage space in which to create such a file. KVP terminates.

Response
Make storage space available under `/opt`.

KVP0008 OPEN ERROR NODE=(&00) (&01)

&00 = Node, &01 = Reason

KVP0010 CONNECTION REQUEST REJECTED: USERID (&00) IS LOCKED

&00 = User ID (login name)

Meaning

1. The specified user ID has been locked.
2. The user ID has been declared invalid because it has not been used for the specified number of days.
3. The expiry date of the specified user ID has been reached.

   After this date it is no longer possible to access the system under this user ID.

It remains locked until the password of the specified user ID is defined via the UNIX user administration.

KVP0013 STATION (&00) REJECTED BY SYSTEM: CONSOLE (&01) IS UNKNOWN

&00 = User ID, &01 = Mnemonic name of console

Response
The specified mnemonic name of the console must either be entered in the BS2000 parameter file `SYSPAR.BS2....` (the precise file name depends on the version) or must be modified in the KVP parameter file.

KVP0014 STATION (&00) REJECTED BY SYSTEM: CONSOLE (&01) IS ALREADY ASSIGNED

&00 = User ID, &01 = Mnemonic name of console

Meaning
Another station is already logged on at the BS2000 system with the specified mnemonic console name. This mnemonic console name is not currently available.

KVP0019 SYSTEM IS NOT READY FOR INPUT

Meaning
BS2000 is not active, the IPL has not terminated or still has to be started. The message is output if console I/O traffic (read path) is disrupted (system/hardware error).

Response
You must wait for the end of the current IPL or perform a new IPL.

KVP0020 SYSTEM INPUT FROM CONSOLE (&00) TIMED OUT

&00 = Mnemonic name of console

Meaning
BS2000 has not accepted an input.

Response
Repeat the input. If it is rejected again, perform a new IPL.

KVP0041 COMMENCING BS2000 SHUTDOWN - (&00)

&00 = Explanatory text

Meaning
An extraordinary BS2000 shutdown has been initiated. The text specifies the cause.

KVP0042 COMMENCING SYSTEM SHUTDOWN - STOP OF KVP IN MAXIMUM (&00) MINUTES

&00 = Maximum wait time

Meaning
BS2000 is termited. KVP is then terminated. UNIX is terminated at the latest on expiry of the specified time.

This message may also be issued if an environment fault has occurred.

- Fan fault
- Temperature monitoring
- Power supply fault

Response
In the case of an environment fault: identify and eliminate the cause. If necessary, inform the service staff.

KVP0054 INPUT TO (&00) REJECTED UNTIL LOGGING IS POSSIBLE

&00 = Partner (SYS, SVP)

Response
The original error must be eliminated (see the preceding messages). You can then repeat the input. If it is not possible to eliminate the original error, logging may also be deactivated.

KVP0070 NO WORKING-STORAGE AVAILABLE FOR (&00) - ENTER INPUT AGAIN

&00 = KVP name (HV0, VM1, VM2 etc.)

Response
You must repeat the input. If this does not help, you must terminate KVP via the “KVP Administration” menu and then restart it.

KVP0071 INPUT LOCKED - PRESS F2 KEY

Response
Input is currently locked. You can press the F2 key to open a selection screen in which you can unlock input. To do this, you must enter the password.

If the UNIX login is locked, access to the console is aborted. Use of the login remains locked until the password corresponding to the login is defined via the UNIX user administration.

KVP0072 'LAST MESSAGES' CAN NOT BE DISPLAYED - NO MEMORY AVAILABLE

Meaning
The menu function “LAST MESSAGES” cannot be executed because the file system is full.

Response
Delete any unnecessary files.

KVP0111 STATION (&00) CONNECTED FROM TERMINAL ((&01)) AS CONSOLE (&02)

&00 = User ID, &01 = Device name, &02 = Mnemonic name of console or SVP device

KVP0112 STATION (&00) DISCONNECTED FROM TERMINAL ((&01)) AS CONSOLE (&02)

&00 = User ID, &01 = Device name, &02 = Mnemonic name of console or SVP device

KVP0120 INVALID BS2000 MESSAGE TO CONSOLE (&00)

&00 = Mnemonic name of console

Meaning
The specified length of a BS2000 message does not correspond to the received length. The message is also output if console I/O traffic is disrupted.

Inform the service staff because a system/hardware error or an internal overwrite error has occurred.

KVP0801 FILE-LOGGING FAILED

Response
The access rights to the file structure /var/opt/SMAW/X2000/log and the file /var/opt/SMAW/X2000/log/log_info should be checked and, if necessary, corrected. This message is also output if archiving is set to FORCED and none of the existing logging files could be archived. The system administrator must make sure that the archiving command can be terminated without errors or the files must be deleted.

KVP0802 (&00) ARCHIVING FAILED

&00 = Archive file name

Meaning
The archiving command terminated with an error. If Archiving required is set then the oldest logging file is deleted when the configured number of logging files is reached. If Archiving requested is set then the attempt to archive the file is repeated at periodic intervals.

Response
Check the archiving command for errors. If you are archiving to tape you may need to insert a new tape and perform a manual backup.

KVP5000 KVP MESSAGE FILE COULD NOT BE OPENED

Meaning
The message file kvp.cat under /opt/SMAW/X2000/lib/nls/de or /opt/SMAW/X2000/lib/nls/en no longer exists or the access rights are set incorrectly. KVP continues to run but uses English message texts.

Response
You should check the file access rights and correct them if necessary. The file can be read in again from the backup volume or the installation volume. You must then restart KVP.

KVP5001 INVALID KVP PARAMETER (&00)

&00 = Parameter

Meaning
KVP was called with invalid parameters. KVP terminates.

Response
Call KVP with a valid system designation.

The system designation must consist of three alphanumeric characters:
– The channel parameter must be a number between 0 and 127.
– The unit parameter must be a number between 0 and 254.
– The line parameter consists of the letter B (bus).

The trace parameter must be a number between 1 and 255.

13.2 SVP emulation messages

The messages issued by the SVP emulation start with the message code SVR.

SVR0000 xxxx started with device MM, console NN, iorsf P, BS2-Sys SS

xxxx = IPL, DIPL or VIPL

Meaning
The IPL has been started. BS2000 is loaded from device MM, NN is defined as the console, the IORSF parameter list P is used and SS is defined as the BS2000 system name.

SVR0001 xxxx returncode: IPL OK

xxxx = IPL, DIPL or VIPL

Meaning
IPL was performed without errors. BS2000 has been started.

SVR0002 xxxx returncode: yyyyyy

xxxx = IPL, DIPL or VIPL

Meaning
IPL was aborted with an error (yyyyyy = cause of error).

Response
Eliminate the error and recommence IPL.

SVR0003 unknown xxxxreturncode: yy

xxxx = IPL, DIPL or VIPL, yy = returncode

Meaning
IPL was aborted with an unspecified error code.

Response
Back up the RMAssist Trace and send it to ITS for diagnosis.
(var/opt/SMAW/X2000/tmp/rma_trace*)

SVR0004 START-xxxx aborted

xxxx = IPL, DIPL or VIPL

Meaning
The IPL has been aborted.

Response
Recommence IPL.

SVR0005 START-xxxx aborted (nnnnnn)

xxxx = IPL, DIPL or VIPL

Meaning
IPL was aborted with errors (nnnnnn = cause of error).

SVR0006 Incorrect command: xx

xx = command entered

Meaning
An incorrect command has been entered.

Response
Enter command correctly.

SVR0008 xxxx started

xxxx = IPL, DIPL or VIPL

Meaning
An operation has been started.

SVR0009 CPU xx not stopped

Meaning
A CPU was not stopped on sv.ipl.

SVR0012 IOHDUMP=xxxxxxxxxxxxxxxxx

Meaning
An IOHDUMP xxxxxxxxxxxxxxxxx is being generated.

SVR0013 IOHDUMP finished: OK

Meaning
Generation of the IOHDUMP is complete.

SVR0014 IOSDUMP finished: OK

Meaning
Generation of the IOSDUMP is complete.

SVR0015 IOHDUMP finished with error

Meaning
Generation of the IOHDUMP was not completed.

Response
Repeat IOHDUMP

SVR0020 Channel initialization active, please wait

Meaning
Channel initialization is not yet complete.

Response
Wait until channel initialization is complete.

SVR0021 IOD channel initialization started - please wait

Meaning
IOD channel initialization has been started.

Response
Wait until channel initialization is complete.

SVR0022 IOD channel initialization finished

Meaning
IOD channel initialization has been performed correctly.

SVR0024 IOD IORSF-level started

Meaning
Output of IORSF file list

SVR0025 IOD IORSF-level finished: OK

Meaning
Output of the IORSF file list has been completed successfully.

SVR0027 No IORSF level found - 0 is assumed

Meaning
No IORSF level was specified during an IPL following a new installation. The default IORSF level 0 is used.

Response
Specify the correct IORSF level on the next IPL.

SVR0029 VM not active - START system in native mode

Meaning
The system will be started in native-mode, while the VM-Mode is not activated.

Response
If VIPL is really wanted, activate the VM-Mode via PrimePower ServerView Suite.

SVR0030 START VIPL aborted – VM not active

Meaning
The VIPL was aborted because the VM mode was not activated.

Response
Activate VM-Mode via PRIMEPOWER ServerView Suite.

SVR0031 Restart VM Monitor aborted (nnnnnnnn)

Meaning
The VMMR was aborted (nnnnnnnn = cause of the error).

Response
Correct the error. The restart is not possible, if the VM-mode is not activated via PRIMEPOWER ServerView Suite.

SVR0032 Restart VM Monitor OK

Meaning
The VMMR was performed without errors.

Response
None

SVR0040 MDEBUG is running – no action

Meaning
The mdebug program is loaded. The specified command is not executed.

Response
Terminate the mdebug program.

SVR0042 xxxx-Parameter error – no start of IPL

xxxx = IPL, DIPL or VIPL

Meaning
An incorrect parameter was entered in the IPL command.

Response
Repeat the command correctly.

SVR0048 error by SLED DUMP

Meaning
An error occurred when generating or writing a SLED DUMP.

Response
Repeat the dipl command

13.3 IOD messages

13.3.1 Messages referring to bus devices

The messages issued by the I/O handler for bus devices begin with the message code IOD0xxx to IOD9xxx.

```
IOD0000   IOD_Vxx RELEASE SL=mmm *** IOD-BUS IMPL READY ***
IOD0000   IOD GENERATED ON YYYY/MM/DD AT HH:MM:SS
```

Meaning
The IOD (I/O handler for bus devices whose I/Os are performed via X2000) issues this message on every long IPL (=IMPL). It contains the generation date and the version of the employed IOD. mmm could be, for example, 001.

```
IOD0001   IOD_Vxx RELEASE SL=mmm *** IOD IPL READY ***
```

Meaning
The IOD (I/O handler for bus devices whose I/Os are performed via X2000) issues this message on every IPL.

```
IOD0859   IOT11 NO PCIB ADDITIONAL SPACE AVAILABLE
```

Meaning
A new device has been configured in X2000. The device could not be activated because the maximum number of devices newly configured during the system run has been exceeded.

Response
Perform an IMPL. It is then possible to configure new devices.

```
IOD0869   IOT01 DEVICE MN=xxxx DEACTIVATED
```

Meaning
The configuration data of the device with the mnemonic name xxxx has been modified. The device has therefore been deactivated. The device can no longer be operated by BS2000 (condition code 3).

```
IOD0869   RKF05 DEVICE MN=xxxx ACTIVATED
```

Meaning
A new or existing device with the mnemonic name xxxx has been activated. The device can now be operated from BS2000.

```
IOD0879    IOD_Vxx SL=mmm. * Device configuration request from X2000 *
IOD0879    RKF00 PCIB INVALID CHN=y UA=zz - REQUEST REJECTED
```

Meaning
A new device has been configured in X2000. The data passed from X2000 is incorrect.
CHN: Host connector number (equivalently to CHPID).

Response
Repeat configuration in X2000. If this repetition is unsuccessful, an IOHDUMP should be generated and then analyzed or sent to a Support Center.

```
IOD0879    IOD_Vxx SL=mmm. * Device configuration request from X2000 *
IOD0879    RKF01 DEVICE MNEMONIC xxxx NOT SYSTEM-UNIQUE -REQUEST REJECTED
```

Meaning
A device with this mnemonic name already exists in the configuration.

Response
Repeat the operation with a different mnemonic name.

```
IOD0879    IOD_Vxx SL=mmm. * Device configuration request from X2000 *
IOD0879    RKF02 DEVICE xxxx CHANGED TO xxxx - REQUEST REJECTED
```

Meaning
The mnemonic name of a device which is already present in the configuration has been modified.

Response
Repeat the operation with a different mnemonic name or select an unused unit address.

```
IOD0879    IOD_Vxx SL=mmm. * Device configuration request from X2000 *
IOD0879    RKF03 DEVICE CHN=xx UA=yy OF TYPE vv CHANGED TO ww - REQUEST REJECTED
```

Meaning
A device has been modified in X2000. The entered device type does not correspond to the type in the IOD.

Response
Repeat the configuration in X2000 with the device type vv. If a device of type ww is absolutely necessary, you should select a different UA (unit address).

```
IOD0888    IOD_Vxx SL=mmm *** IOD NON FATAL ERROR! ***
IOD0888    *** ERROR CODE=modyyy *** CHECK IOHDUMP!
```

Meaning
IOD has detected an error but the system continues to run. An IOHDUMP has been generated. This is stored under /var/opt/SMAW/X2000/dump/ .

Meaning
Analyze the IOHDUMP with mdebug or send it to the Support Center.

```
IOD0999    IOD_Vxx SL=mmm *** IOD ABNORMAL END ***
IOD0999    *** ERROR CODE=modyyy *** START IMPL!
```

Meaning
IOD has detected an error and terminated the system run. On the next system start (IMPL), an IOHDUMP will be generated and saved in the directory `/var/opt/SMAW/X2000/dump/`.

```
IOD0999    *** ERROR CODE=CPIO15 *** START IMPL!
```

Meaning
The HAL has not responded to the initialization message within 10 seconds.

Response
Identify the cause of the error and repeat the IMPL or execute `bs2init 0` and `bs2init 1`.

```
IOD0999    *** ERROR CODE=CPIO18 *** START IMPL!
```

Meaning
The HAL has not responded to the device configuration message within 10 seconds.

Response
Identify the cause of the error and repeat the IMPL or execute `bs2init 0` and `bs2init 1`.

```
IOD0999    *** ERROR CODE=CPIO21 *** START IMPL!
```

Meaning
The HAL has not responded to the DUMP address message within 10 seconds.

Response
Identify the cause of the error and repeat the IMPL or execute `bs2init 0` and `bs2init 1`.

```
IOD0999    *** ERROR CODE=CPIO22 *** START IMPL!
```

Meaning
The HAL has not responded to the vector table message within 10 seconds.

Response
Identify the cause of the error and repeat the IMPL or execute `bs2init 0` and `bs2init 1`.

```
IOD0999    *** ERROR CODE=CPIO89 *** START IMPL!
```

Meaning
The number of bus devices is smaller than 3 or greater than 32768.

Response
Check the BU device configuration, make any necessary changes and repeat the IMPL or execute `bs2init 0` and `bs2init 1`.

IOD0999 *** ERROR CODE=IPL005 *** START IMPL!

Meaning
The RMAssist has not responded to an IOD message within 10 seconds.

Response
Identify the cause of the error and repeat the IMPL or execute `bs2init 0` and `bs2init 1`.

IOD3000 IO-CONFIGURATION ERROR: DEV#/MN xxxx/yyyy NOT UNIQUE

Meaning
The device with the device number xxx and the mnemonic yyyy is configured both as a bus and as a channel device. The bus device has been deactivated, only the channel device can be operated from BS2000.

Response
Reconfigure the bus device with a new mnemonic and a different unit address in X2000.

13.3.2 Messages referring to channel devices

The messages issued by the I/O handler for channel devices begin with the message codes IODAxxx to IODZxxx.

IODC000 IOS0000 IOD CHANNEL STARTUP FINISHED

Meaning
This message indicates that IOD channel startup has run correctly.

IODC002 IORSF TITLE: ...
IODC003 IOCFID: ....

Meaning
These both messages specify the title of the loaded IORSF.

IODE000 CHPID xx module soft error

Meaning
The module firmware has performed internal error handling and generated a logout.

Response
The error has been eliminated for the present by the error handling operation. Nevertheless, the result of the analysis of the corresponding logout should be evaluated and maintenance undertaken if necessary.

IODE020 CHPID xx module error

Meaning
This message is issued at the start of module stop error handling. This message is for diagnostic purposes and is output only if the service engineer specifies this explicitly.

Response
See the messages IODE021, IODE022.

IODE021 CHPID xx module error: module restarted

Meaning
Module stop error handling has been performed successfully. The module has been initialized and started. A logout has been stored.

Response
The error has been eliminated for the present by the error handling operation. Nevertheless, the result of the analysis of the corresponding logout should be evaluated and maintenance undertaken if necessary.

IODE022 CHPID xx module error: module stopped

Meaning
Module stop error handling has been terminated with an error or due to the presence of a persistent error. The module has been stopped and identified as defective. A logout has been stored.

Response
The error could not be eliminated by the error handling operation. The result of the analysis of the corresponding logout should be evaluated and maintenance undertaken. The module is not available again until channel initialization has been repeated following a Solaris boot operation or the RMAssist command `chinit`.

IODE040 Error simulation initiated

Meaning
An error simulation has been activated. The error simulation may trigger error handling.

Response
No maintenance response is required.

IODE050 CHPID xx Vary channel path offline

Meaning
This message is issued at the start of the MSSF call `CHPOFF – vary channel path offline`. This message is for diagnostic purposes and is output only if the service engineer specifies this explicitly.

Response
See the messages `IODE051, IODE052, IODE053, IODE054, IODE055`.

IODE051 CHPID xx has been varied offline

Meaning
The MSSF call `CHPOFF – vary channel path offline` has switched the module to the offline state.

Response
No maintenance response is required.

IODE052 CHPID xx was already offline

Meaning
The module was already in the offline state at the time of the MSSF call `CHPOFF – vary channel path offline`.

Response
No maintenance response is required.

IODE053 CHPID xx vary offline rejected: hardware error

Meaning
The MSSF call CHPOFF – vary channel path offline was rejected because of the presence of a hardware error. Appropriate error handling is performed for the hardware error.

Response
For information on error handling, see the messages relating to module stop error handling (IODE021, IODE022).

IODE054 CHPID xx vary offline rejected: busy

Meaning
The MSSF call CHPOFF – vary channel path offline was rejected because error handling was simultaneously active. BS2000 automatically repeats the MSSF call. This message is for diagnostic purposes and is output only if the service engineer specifies this explicitly.

Response
For information on error handling, see the messages relating to module stop error handling (IODE021, IODE022).

IODE055 CHPID xx vary offline rejected: CHPID invalid

Meaning
The MSSF call CHPOFF – vary channel path offline was rejected because the specified CHPID is invalid.

Response
Check the configuration.

IODE060 CHPID xx vary channel path online

Meaning
This message is issued at the start of the MSSF call CHPON – vary channel path online. This message is for diagnostic purposes and is output only if the service engineer specifies this explicitly.

Response
See the messages IODE061, IODE062, IODE063, IODE064, IODE065.

IODE061 CHPID xx has been varied online

Meaning
The MSSF call CHPON – vary channel path online has switched the module to the online state.

Response
No maintenance response is required.

IODE062 CHPID xx was already online

Meaning
The module was already in the online state at the time of the MSSF call CHPOFF – vary channel path online.

Response
No maintenance response is required.

IODE063 CHPID xx vary online rejected: hardware error

Meaning
The MSSF call CHPON – vary channel path online was rejected because of the presence of a hardware error. Appropriate error handling is performed for the hardware error.

Response
For information on error handling, see the messages relating to module stop error handling (IODE021, IODE022).

IODE064 CHPID xx vary online rejected: busy

Meaning
The MSSF call CHPON – vary channel path online was rejected because error handling was simultaneously active. BS2000 automatically repeats the MSSF call. This message is for diagnostic purposes and is output only if the service engineer specifies this explicitly.

Response
For information on error handling, see the messages relating to module stop error handling (IODE021, IODE022).

IODE065 CHPID xx vary online rejected: CHPID invalid

Meaning
The MSSF call CHPON – vary channel path online was rejected because the specified CHPID is invalid.

Response
Check the configuration.

IODE0E0 Error Code xx: Error detected by IOD-Firmware

Meaning
The IOD has detected an internal error and has reset the channel subsystem. All installed components of the channel subsystem are initialized and started.

Response
The error has been eliminated for the present by the error handling operation. There is generally no hardware error present when the IOD detects such an internal error. Consequently, the result of the analysis of the corresponding logouts does not output any hardware errors or instructions for replacement. Inform the Support Center.

IODE0E1 Subchannel mark timeout

Meaning
This message is output in addition to the message IODE0E0.

Response
See the message IODE0E0.

IODE0E2 aaaaaaaa: xxxxxxxx xxxxxxxx xxxxxxxx xxxxxxxx

Meaning
This message is output in addition to the message IODE0E0.

Response
See the message IODE0E0.

IODF004 IORSF Error: DEV=xxxx invalidated - CHPID not configured

Meaning
A device is identified as invalid because no channel connection is present.

Response
Regenerate IORSF.

IODF005 IORSF Error: DEV=xxxx invalidated - connected to different PCI-buses

Meaning
A device is identified as invalid because the Multipath mode can only be operated within a UHPS.

Response
Regenerate IORSF.

IODF006 TOO MANY CONTROL UNITS (CUCR) ASSIGNED

Meaning
Content error in IORSF.

Response
Regenerate IORSF.

IODF007 IORSF IDENTIFICATION INVALID

Meaning
Content error in IORSF.

Response
Regenerate IORSF.

IODF008 IORSF ERROR: INVALID CHANNEL INTERFACE TYPE

Meaning
Content error in IORSF (possible cause: IORSF was generated for another system).

Response
Regenerate IORSF.

IODF009 IORSF ERROR: Subchannel # less than 1000

Meaning
Content error in IORSF.

Response
Regenerate IORSF.

IODF010 NO CHANNELS CONFIGURED

Meaning
No channel devices in the I/O configuration.

IODF011 CHPID not found in CCUCEH

Meaning
Content error in IORSF.

Response
Regenerate IORSF.

IODF020 IODF020 CHPID xx TIMEOUT FOR STARTUP INFO XFER

Meaning
Hardware error.

Response
Inform the maintenance staff.

IODF021 MORE THAN 64 VALID SCs FOR OEMI MODULE xx

Meaning
Content error in IORSF.

Response
Regenerate IORSF.

13.4 HAL messages

HAL0001 MDEBUG ACTIVE

Meaning
The master debugger mdebug has been started

HAL0002 MDEBUG INCATIVE

Meaning
The master debugger mdebug has been stopped

HAL0140 HAL ABORT GPXX SSSSSSSSSSSSSSS PPPPPPPPPPPPPPP

Meaning
The HAL on this processor has detected an inconsistency and has terminated the processing of BS2000 instructions on all processors.

Response
Please execute the following commands as 'root' user in Solaris.

```
# /opt/SMAW/X2000/bin/save_diag
   or via the event screen
sx.save_diag
```

A full description of the save diag command can be found in section "Create X2000 diagnostic documents" on page 337. Additionally try to take a SLED.

HAL0141 HAL ABORT GPXX SSSSSSSSSSSSSSS PPPPPPPPPPPPPPP OTHER GP

Meaning
The HAL on another processor has detected an inconsistency and has terminated the processing of BS2000 instructions on all processors.

This message is a continuation message from HAL0140.

HAL0211 MDEBUG STOP GPXX SSSSSSSSSSSSSSS PPPPPPPPPPPPPPP

Meaning
The master debugging interface has been used by either mdebug or RMAassist to halt the processing of BS2000 instructions. This may happen as a normal part of IPL processing or if mdebug is being used to examine the system.

Response
If mdebug is being used to examine the system the mdebug command `bg` will restart the processor.

HAL0212 MDEBUG STOP GPXX SSSSSSSSSSSSSSS PPPPPPPPPPPPPPP BREAK-POINT

Meaning
A break point set by mdebug has been executed by the given processor. The processing of BS2000 instructions has been halted.

Response
The mdebug command 'bg' will restart the processor.

HAL0213 MDEBUG STOP GPXX SSSSSSSSSSSSSSS PPPPPPPPPPPPPPP DATA TRAP

Meaning
The given processor has executed an instruction that has modified a virtual memory address that is being watched for modification via mdebug. The processing of BS2000 instructions has been halted.

Response
If mdebug is being used to examine the system the mdebug command `bg` will restart the processor.

HAL0214 MDEBUG STOP GPXX SSSSSSSSSSSSSSS PPPPPPPPPPPPPPP SAVE-STATE

Meaning
The master debugging interface has been used by either mdebug or RMAassist to halt the processing of BS2000 instructions in preparation for a new IPL. This always happens as a normal part of IPL processing.

HAL0215 MDEBUG SPIN GPXX SSSSSSSSSSSSSSS PPPPPPPPPPPPPPP FW-STOP

Meaning
The mentioned processor has interrupted the execution of BS2000 instructions due to a breakpoint hit in HAL set by mdebug.

Response
The mdebug-command "bg" tries to restart the processors. If the breakpoint has been set at a critical position in HAL further errors may occur.

HAL0221 MDEBUG START GPXX SSSSSSSSSSSSSSS PPPPPPPPPPPPPPP

Meaning
The master debugging interface has been used by either mdebug or RMAassist to start the processing of BS2000 instructions. This is not a normal part of IPL processing but the result of administrator intervention with mdebug or RMAssist.

HAL0230 MDEBUG RESET GPXX

Meaning
The master debugging interface has been used by either mdebug or RMAassist to reset the HAL internal interfaces and data structures for the given CPU. This is a normal part of IPL processing.

HAL0311 BS2000 STOP GPXX SSSSSSSSSSSSSSS PPPPPPPPPPPPPPP DISABLED-WAIT

Meaning
A new PSW has been loaded by the given processor in which the wait bit is set and no interrupts are enabled. As a result, the processing of BS2000 instructions has been halted. This may occur as part of a normal shutdown or may be due to a system crash - SETS.

Response
If the BS2000 system is no longer running and was not terminated on purpose, please perform a SLED to secure diagnostic information.

HAL0312 BS2000 STOP GPXX SSSSSSSSSSSSSSS PPPPPPPPPPPPPPP SIGP

Meaning
BS2000 stopped the given processor via a SIGP instruction. This is a normal during BS2000 shutdown or when a CPU is detached but also occurs during a system crash or SETS.

Response
If the BS2000 system is no longer running and was not terminated on purpose, please perform a SLED to secure diagnose information.

HAL0313 BS2000 STOP GPXX SSSSSSSSSSSSSSS PPPPPPPPPPPPPPP SIGP RESET

Meaning
BS2000 has reset the given processor via a SIGP instruction.

HAL0314 BS2000 STOP GPXX SSSSSSSSSSSSSSS PPPPPPPPPPPPPPP SIGP STORE-STATUS

Meaning
BS2000 requested, via the SIGP instruction, that diagnostic information about the current state of the given processor is to be saved.

HAL0321 BS2000 START GPXX SSSSSSSSSSSSSSS PPPPPPPPPPPPPPP SIGP

Meaning
BS2000 has started the given processor via the SIGP instruction.

HAL0322 BS2000 START GPXX SSSSSSSSSSSSSSS PPPPPPPPPPPPPPP IPL-RESTART

Meaning
The master debugging interface has been used by either mdebug or RMAassist to start the processing of BS2000 instructions, directly after a new IPL boot block has been loaded. This is the last step in normal IPL processing.

HAL0350 BS2000 ACF GPXX PPPPPPPP EEEEEEEEEEEEEEEE ALIGNMENT ERROR CORRECTED

PPPPPPPP = The 4 byte program counter.
EEEEEEEEEEEEEEEE = The 8-byte extended address which caused the alignment error.

Meaning
The executing BS2000 program caused an alignment error when accessing data.
The ACF facility then used a slower access method to access the data and enable the program to continue.

Response
Modify the program to align the data correctly. This, in turn, will improve the performance of the program.

HAL0440 IOD ABORT GPXX SSSSSSSSSSSSSSSS PPPPPPPPPPPPPPPP IOD-ABEND

Meaning
An error has been recognized by the input/output driver and processing has been terminated.

Response
Examine the proceeding messages on the BS2000 console for information as to the cause of the problem.

13.5 X2000 channel connection error messages

13.5.1 Structure of message numbers

The messages issued by the X2000 channel connection service functions share the same structure and have the following format:

1	2	3	4	5	6	7	8	9...255
System signature		Process signature	Program signature	Message number			Blank	Program-specific message text

System signature — The service function system signature for the X2000 channel connection is preset to “SV”.

Process signature — The process signature indicates the associated process. The assignment is defined as follows:

..A....	ciodebug	(CIOD debugging)
..D....	cdebug	(channel debugging)
..I....	channel_ipl	(channel initial program load)
..L....	cdump	(logout system)
..M....	channeld	(channel MSSF and event handling)
..N....	cinit	(channel initialization)
..P....	set_spd	(channel set soon power down)
..S....	Script	(initialization script)
..T....	ctest	(channel test system)

Program signature — The program signature identifies the generating program layer. The letters indicate the following program layers:

...A...	HWA	(HW access)
...B...	Log3	only in conjunction with the logout system process signature (..L....)
...I...	HWI	(HW interface)
...M...	MAIN	(main program)
...S...		Only used in conjunction with the initialization script's process signature

13.5.2 Metasyntax

A metasyntax is used to avoid burdening the message text with unnecessary lists.

Text variable	Any text variable is enclosed in angle brackets (e.g. <variable>) and is explained in the associated message description or at the start of the section.

If a text variable expression consists of text then this is explicitly stated.

13.5.3 HWA error messages

The HWA messages are process-independent.

...A003 mmap failed, ...

The system error message is appended to the message.

Meaning
System error/software error**:** A mapping error has occurred.

...A004 ioctl (<request>) failed, ...

The system error message is appended to the message.

Meaning
Software error: The IOCTL request <request> has been aborted.

...A0011 data select error – <data_select> not in range <select_min>...<select_max>

Meaning
Software error: The value for the data selection <data_select> for the AM register is not in the specified range between <select_min> and <select_max>.

...A100 open() failed '<Fname>'
...A100 fopen() failed '<Fname>'

Meaning
File error/software error: The file <Fname> could not be opened. The path rights may have been set incorrectly, the file system may be defective or full or the file may have been deleted.

13.5.4 HWI messages

The HWI messages are process-independent.

HWI message code:

<addr>	Buffer start address for HWI opcode
<chpid> ...	List of CHPIDs for the channels in question
<oc>	Selected HWI opcode (four characters)
<op>	Selected HWI operation (two characters)
<range> ...	List of CHPID areas (x0...xF) of affected channels without further specification

...I003 write access not allowed – opcode:<oc> CHPID(s): <chpid> ...

Meaning
Software error: The write operation is undefined for the selected opcode.

...I004 illegal operation – oper:<op> CHPID(s): <chpid> ...

Meaning
Software error: The transferred operation is undefined.

...I010 illegal opcode – opcode:<oc> CHPID(s): <chpid> ...

Meaning
Software error: The opcode is undefined.

...I011 illegal address – addr:<addr> CHPID(s): <chpid> ...

Meaning
Input error: The CASA address for the opcode is invalid.

...I089 SMAWLboot_G_DATA failed, ...

The system error message is appended to the message.

Meaning
Software error: The “read data from CASA” request has been aborted.

...I090 SMAWLboot_S_DATA failed, ...

The system error message is appended to the message.

Meaning
Software error: The “write data to CASA” request has been aborted.

...I091 mmap_x2 (<request>) failed

Meaning
Software error: The mmap_x2 request <request> has been aborted.

...I092 ioctl (<request>) failed, ...

The system error message is appended to the message.

Meaning
Software error: The ioctl request <request> has been aborted.

...I093 sscanf() format error '<Fname>'

Meaning
File error: The file <Fname> has an invalid format and could not be processed with sscanf.

...I094 fwrite() failed '<Fname>'

Meaning
File error: The file <Fname> could not be written. The file rights may have been set incorrectly or the file system may be defective or full.

...I096 fread() failed '<Fname>'

Meaning
File error: The file <Fname> could not be read. There is an error in the file format or the file system.

...I097 fopen() failed '<Fname>'

Meaning
File error/software error: The file <Fname> could not be opened. The path rights may have been set incorrectly, the file system may be defective or full or the file may have been deleted.

...I098 stat() failed '<Fname>'

Meaning
File error/software error: The file status of the file <Fname> could not be determined. Either the file system is defective or the file has been deleted.

...I190 cannot allocate enough memory

Meaning
It was not possible to reserve sufficient memory for the generation of the file system.

...I191 wrong cabinet ID: <CabId0><CabId1>...<CabId3>(must be 0...4)

Meaning
The cabinet IDs <CabId0> to <CabId3> have been set incorrectly (minimum 1 entry and maximum 4 entries); permitted range of values: 0...4.

...I200 illegal CHPID selection - CHPID range(s): <range> ...

Meaning
Software error: An incorrect channel group selection has been detected.

...I201 hw-configuration changed (channel) - CHPID(s): <chpid> ...

Meaning
Configuration message: The channels' hardware configuration has changed. This message is issued following a channel installation/de-installation operation or after a hardware failure.

...I202 conf-file is corrupted '<Cname>'

Meaning
Software error: The configuration file <Cname> is corrupt.

...I702 cannot get/create semaphore - key: <key> CHPID range(s): <range> ...

Meaning
Software error/configuration error: The semaphore with the key <key> (eight characters) cannot be read or cannot be generated. The semaphore has an invalid value or the access rights have been set incorrectly.

...I703 cannot reserve semaphore - CHPID range(s): <range> ...

Meaning
Reservation error: The semaphore cannot be reserved because it is occupied by another process. An attempt is made to identify the competing process (occupant) (for more information, see section “Initialization script messages” on page 379: Error message ..SS101).

Response
It is necessary to wait until the other process has released the semaphore. In the case of the cdebug program, close the current window and wait until the semaphore is released. Then re-open the window.

...I704 cannot set semaphore - key: <key> CHPID range(s): <range> ...

Meaning
Software error/configuration error: The semaphore with the key <key> (eight characters) cannot be initialized.

...I705 cannot release semaphore - key: <key> CHPID range(s): <range> ...

Meaning
Software error/configuration error: The semaphore with the key <key> (eight characters) cannot be released.

13.5.5 MAIN messages

The MAIN message numbers are process-dependent, i.e. the message is only unique if accompanied by a process signature.

13.5.5.1 ciodebug messages

ciodebug message code:

<chpid> Channel Path Identification

..AM001 illegal chpid <chpid>

Meaning
Software error: The storage area in CASA cannot be allocated because the CHPID <chpid> is incorrect.

13.5.5.2 cdebug messages

..DM001 illegal opcode

Meaning
Software error: A request with an unspecified operation code was executed.

..DM002 too many or too few arguments

Meaning
Software error: A request with an incorrect number of arguments was executed.

..DM003 cannot open device <Dname>, ...

The system error message is appended to the message.

Meaning
The device file is being used or there is a configuration error: The device <Fname> could not be opened.

13.5.5.3 channel_ipl messages

channel_ipl message code:

<chpid> ...	List of CHPIDs for the channels in question
<oc>	Selected HWI opcode (four characters)
<range> ...	List of CHPID areas (x0...xF) of affected channels without further specification

..IM001 usage description
usage : Format: channel_ipl <opcode> [<iorsflevel>]
<opcode> -> impl, iorsf, stop, dump, start
<iorsflevel> -> 0 - 9, a, - (only if <opcode> = start)

Meaning
Basic or additional information: This message is output if the channel_ipl program has been called without arguments or may be output together with the error messages ..IM001 invalid opcode: <oc> and ..IM001 too many operands, in which case it specifies the permissible operation codes.

Optional arguments are specified in square brackets.

..IM001 invalid opcode: <oc>

The message ..IM001 usage description is also output.

Meaning
Software or user error: The channel_ipl program was called with an incorrect operation code <oc>.

..IM001 too many arguments

The message ..IM001 usage description is also output.

Meaning
Software or user error: The channel_ipl program was called with more than one argument.

..IM020 reconfiguration logout saved

Meaning
Runtime message: A reconfiguration logout has been written. A separate message has been issued for the affected channel groups (see message ..IM032).

..IM021 IOS dump

Meaning
Runtime message: The content of the CASA shadow memory is being written to the IOS dump file.

..IM022 CASA init

Meaning
Runtime message: The CASA shadow memory is being initialized

..IM023 IOCF file iorsf<level> loaded

Meaning
Runtime message: The IOCF file with the IORSF level <level> has been loaded into the shadow memory.

..IM024 no IOCF file loaded

Meaning
Runtime message: No IOCF file has been loaded into the shadow memory. Either no IORSF level was specified or the IOCF file with the specified level does not exist.

..IM026 IOSDUMP=<filename>

Meaning
Runtime message: The CASA dump (IOSDUMP) has been written to the file with the name <filename>.

..IM029 I960 processor will be clocked with 66 MH for channel(s) with CHPID: <chpid0> ...

Meaning
Runtime message: The processor for the channels with the listed CHPIDs will be clocked at 66 MHz.

..IM032 channel(s) reconfigured - CHPID(s): <chpid> ...

Meaning
Runtime message: The channels were reconfigured because of a hardware error during initialization.

..IM094 fwrite() failed '<Fname>'

Meaning
File error: The file <Fname> could not be written. The file rights may have been set incorrectly or the file system may be defective or full.

..IM096 fread() failed '<Fname>'

Meaning
File error/software error: The file <Fname> could not be read. There is an error in the file format or the file system.

..IM097 fopen() failed '<Fname>'

Meaning
File error/software error: The file <Fname> could not be opened. The path rights may have been set incorrectly, the file system may be defective or full or the file may have been deleted.

..IM099 fseek() failed '<Fname>'

Meaning
File error/software error: The positioning in the file <Fname> was invalid. The file was not opened or the position was beyond the end-of-file.

..IM103 cannot open device <Dname>, ...

The system error message is appended to the message.

Meaning
The device file is being used or there is a configuration error: The device <Fname> could not be opened.

13.5.5.4 Logout system messages

cdump is not an independent process but forms a component part of all the processes capable of generating a logout. The logout type is retained. Even where the logout data cannot be backed up, a file with a length 0 is created in the corresponding directory (logging-V3-additional info is not available).

Logout type	Directory	File
chat-logouts	/var/opt/SMAW/X2000/dump/channel/ios	lf<seqnr>
chat-periphery	/var/opt/SMAW/X2000/dump/channel/ios_per	lf<seqnr>
chat-texts	/opt/SMAW/SMAWlog3	chat_txt<n>log
uhps-logouts	/var/opt/SMAW/X2000/dump/channel/uhps	lf<seqnr>

n File sequence number (one decimal place: 0...1)
seqnr Sequence number (four decimal places: 0000...9999)

Text logouts are entered in the file chat_txt0log; binary layouts are entered in type-dependent directories as independent files (with a unique sequence number). Each sequence number <seqnr> is assigned progressively and once only for binary logouts. The sequence number is determined by the time sequence of the incidence of an event. 9999 for the sequence number is followed by 0000. In all cases only the last 1000 binary logouts (chat-logouts and chat-periphery) or 100 binary logouts (uhps-logouts) are present.

SVLB000 sequence number access error, logout dropped

Meaning
Error in creating the binary logout file lfxxxx (<xxxx> = logout sequence number). The logout data cannot be analyzed and cannot be backed up.

SVLB001 error create lfxxxx

Meaning
Error in creating the binary logout file lfxxxx (<xxxx> = logout sequence number). The logout data cannot be analyzed and cannot be backed up.

SVLB002 error write lfxxxx

Meaning
Error in writing in the binary logout file lfxxxx (<xxxx> = logout sequence number). The logout data cannot be analyzed and cannot be backed up.

SVLB003 error create resxxxx

Meaning
Error in creating the result file resxxxx (<xxxx> = logout sequence number). The logout data cannot be analyzed but the basic binary logout is backed up and can be displayed via logging-V3-additional info.

SVLB004 error write resxxxx

Meaning
Error in writing in the result file resxxxx (<xxxx> = logout sequence number).The logout data cannot be analyzed, but the basic binary
logout is backed up and can be displayed via logging-V3-additional info.

SVLB005 error call analysis program

Meaning
Internal process error in calling the logout analysis program. The logout data cannot be analyzed but the basic binary logout is backed up and can be displayed via logging-V3-additional info.

SVLB006 logout analysis timeout

Meaning
The logout analysis has supplied no analysis result within a timeout time of 10 seconds. The analysis is interrupted, the basic binary logout is backed up and can be displayed via logging-V3-additional info.

SVLB007 no result from logout analysis

Meaning
The logout analysis has been interrupted without an analysis result and with an error status. The basic binary logout is backed up and can be displayed via logging-V3-additional info.

SVLB008 result compare error

Meaning
Error in comparing the analysis result with the previous result. No analysis result is backed up, but the basic binary logout is backed up and can be displayed via logging-V3-additional info.

SVLM001 <text>

Meaning
Analysis result of an SVP logout

SVLM002 <text>

Meaning
Analysis result of an FW module logout

SVLM003 <text>

Meaning
Analysis result of an SVP module logout

SVLM004 <text>

Meaning
Analysis result of a reconfiguration logout

SVLM005 <text>

Meaning
Analysis result of a UHPS logout

13.5.5.5 channeld messages

channeld message code:

<chpid> Channel Path Identification (CHPID: two characters)

..MM001 too many arguments

Meaning
Software error/application error: The channeld daemon was called with incorrect arguments.

..MM003 cannot open device <Dname>, ...

The system error message is appended to the message.

Meaning
The device file is being used or there is a configuration error: The daemon was not able to open the device <Dname>.

..MM004 ioctl (<request>) failed, ...

The system error message is appended to the message.

Meaning
Software error: The IOCTL request <request> has been aborted.

..MM005 end of channeld by SIGTERM

Meaning
Runtime message: The daemon was terminated by the signal SIGTERM.

..MM006 <Dfunc>: sigaction() failed

Meaning
Software error: Signal processing sigaction was incorrect in the daemon function <Dfunc>.

..MM201 illegal opcode from IOD (<IOrequest>)

Meaning
Software error: The request sent by the IOD <IOrequest> (two characters) is undefined.

..MM202 illegal mssf call (<SYrequest>)

Meaning
Software error: The request sent by the system <SYrequest> (eight characters) is undefined.

..MM220 GENSTOP activated

Meaning
Runtime message: GENSTOP is activated and all channels have been stopped.

..MM294 fwrite() failed '<Fname>'

Meaning
File error: The file <Fname> could not be written. The file rights may have been set incorrectly or the file system may be defective or full.

..MM296 fread() failed '<Fname>'

Meaning
File error: The file <Fname> could not be read. There is an error in the file format or the file system.

..MM297 fopen() failed '<Fname>'

Meaning
File error/software error: The file <Fname> could not be opened. The path rights may have been set incorrectly, the file system may be defective or full or the file may have been deleted.

..MM299 fseek() failed '<Fname>'

Meaning
File error/software error: The positioning in the file <Fname> was invalid. The file was not opened or the position was beyond the end-of-file.

..MM401 illegal CHPID <chpid>; undefined channel group number

Meaning
Software error: The channel group selection of the channel path identification <chpid> is incorrect.

..MM402 illegal CHPID <chpid>; undefined channel number

Meaning
Software error: The channel number of the channel path identification <chpid> is incorrect.

13.5.5.6 cinit messages

cinit message code:

<oc> Selected HWI opcode (four characters)

..NM001 usage description
usage : format: cinit <opcode>
<opcode> -> on, init

Meaning
Basic or additional information: This message is output if the cinit program has been called without arguments or may be output together with the error messages ..NM001 invalid opcode <oc> and ..NM001 too many arguments, and the possible arguments for the operation codes are specified.

..NM001 invalid opcode: <oc>

The message ..NM001 usage description is also output.

Meaning
The cinit program was called with an incorrect operation code <oc>.

Response
The call must be repeated using the correct operation code.

..NM001 too many arguments

The message ..NM001 usage description is also output.

Meaning
The cinit program was called with more than two arguments.

Response
The call must be repeated using the correct arguments.

..NM020 reconfiguration logout saved

Meaning
Runtime message: A reconfiguration logout was written.

..NM100 ioctl (<request>) failed, ...

The system error message is appended to the message.

Meaning
Software error: The IOCTL request <request> has been aborted.

13.5.5.7 set_spd messages

..PM096 fread() failed <Cfile>

Meaning
Software error: The configuration file <Cfile> could not be read.

..PM097 fopen() failed <Cfile>

Meaning
Software error: The configuration file <Cfile> could not be opened. The path rights may have been set incorrectly, the file system may be defective or full or the file may have been deleted.

13.5.5.8 ctest messages

ctest message code:

<B-type>	Board type
<D-no>	D number (PCB number)
<busid>	Bus identification
<cabid>	Cabinet identification
<chpid>	Channel path identification (CHPID)
<rep>	Repetition count
<slotid>	Slot identification
<test>	Test number

```
..TM001     usage description
            usage : Format: -q
                            -d -k <CHPID> [-t <test number 1>][ -r <repetition count>]
                            -l -k <CHPID> [-t <test number 2>][ -r <repetition count>]
            <CHPID>              -> 0x80...0x8e, 0x90...0xff
            <test number 1>      -> 1...4    (default: 0 = all tests)
            <test number 2>      -> 1...2, 4 (default: 0 = all tests)
            <repetition count> -> 1...9999 (default: 1)
```

Meaning
Basic or additional information: The message is output together with all the error messages with the number ..TM001 and specifies the possible arguments.

Optional arguments are specified in square brackets.

```
..TM001     no arguments
```

The message ..TM001 is also output.

Meaning
Warning: No arguments were specified when calling the ctest program.

```
..TM001     too many arguments
```

The message ..TM001 is also output.

Meaning
Warning: Too many arguments were specified when calling the ctest program.

```
..TM001     empty channel selection (CHPID)
```

The message ..TM001 is also output.

Meaning
Warning: The -k option but no CHPID was specified.

..TM001 wrong channel selection <chpid> (CHPID)

The message ..TM001 is also output.

Meaning
Warning: The formally incorrect CHPID <chpid> was specified (outside the number ranges 80...8E and 90...FF).

..TM001 no related channel for CHPID <chpid>

The message ..TM001 is also output.

Meaning
Warning: No channel exists for the specified CHPID <chpid>.

..TM001 option (-d, -l or -q) will be set twice

The message ..TM001 is also output.

Meaning
Warning: More than one of the options -d, -l or -q was specified.

..TM001 channel selection (CHPID) will be set twice

The message ..TM001 is also output.

Meaning
Warning: Two CHPIDs were specified.

..TM001 empty repetition count

The message ..TM001 is also output.

Meaning
Warning: The -r option but no repetition counter was specified.

..TM001 wrong repetition count

The message ..TM001 is also output.

Meaning
Warning: The repetition counter has not been specified in decimal form or is greater than 9999.

..TM001 repetition count will be set twice

The message ..TM001 is also output.

Meaning
Warning: A repetition counter has been specified twice.

..TM001 empty test number

The message ..TM001 is also output.

Meaning
Warning: The -t option but no test number was specified.

..TM001 wrong test number <test>

The message ..TM001 is also output.

Meaning
Warning: The test number is not 0 (all tests) or not in the number range 1...4.

..TM001 test number will be set twice

The message ..TM001 is also output.

Meaning
Warning: A test number has been specified twice.

..TM001 unexpected argument

The message ..TM001 is also output.

Meaning
Warning: An unexpected option was passed as an argument.

..TM001 no option (-d, -l or -q) was set

The message ..TM001 is also output.

Meaning
Warning: None of the options -d, -l or -q was specified.

..TM001 no further option (-k, -r or -t) was allowed

The message ..TM001 is also output.

Meaning
Warning: No further -k, -r or -t options are permitted for the -q option.

..TM001 channel selection missing

The message ..TM001 is also output.

Meaning
Warning: A channel selection -k is required for the -d or -l option.

..TM001 test number 3 not allowed for option -l

The message ..TM001 is also output.

Meaning
Warning: Test number 3 is not permitted for the -l option.

..TM002 error in channel test <test> CHPID <chpid>
CABINET ID: ? BUS ID: ? – <B-type>, SLOT ??, <D-no>

Meaning
A channel test program has detected an error:
There is no valid cabinet ID for the current CHPID <chpid>; the IOCTL request PCHAN_CHAN_GET_LOC has been acknowledged incorrectly.

Response
Locate the error.

..TM002 error in channel test <test> CHPID <chpid>
CABINET ID: <cabid> BUS ID: <busid> – <B-type>, SLOT <slotid>, <D-no.>

Meaning
A channel test program has detected an error.

Response
Locate the error.

13.5.6 Initialization script messages

script message code:

<dev>	Device
<proc>	Name of the process
<pid>	ID of the process

..SS000 usage: cipl <ciodstart|dump|impl|iorsf|start[<0|1..|9|A|->]|stop>

Meaning
The cipl script was called with incorrect parameters. The error message specifies the possible parameters.

Optional arguments are specified in square brackets. The values of a mandatory argument are specified between angle brackets and separated by vertical lines.

Response
The call must be repeated using the correct parameters.

..SS001 cannot stop 'channeld'

Meaning
Software error: The background daemon channeld cannot be stopped.

..SS002 channel initialization active, please wait

Meaning
Runtime message: The cipl script has been started while the channel system is being initialized. The script waits until initialization of the channel system has terminated.

..SS003 channel initialization timed out

Meaning
Software error: The cipl script was aborted because initialization of the channel system was not terminated within the predefined period (10 minutes).

..SS101 device <dev> occupied by '<proc>' PID: <pid>

Meaning
Reservation error: The called process is aborted because the device <dev> has been reserved by the process <proc> with the ID <pid>.

If a semaphore cannot be reserved even though the competing process is subsequently terminated, then <proc> is an empty string and multiple <pids> may be displayed.

Example: device /dev/apc/cha1 occupied by '' PID: 213 430 431

The message ...I703 cannot reserve semaphore (see section "HWI messages" on page 364) is also output.

Response
It is necessary to wait until the other process has released the semaphore.

..SS201 device occupied or semaphore reserved

Meaning
Reservation error: In the case of the cdebug script, this error message indicates that the semaphore could not be reserved since it is occupied by a competing process. The occupant is not identified.

Response
Close the current window, wait for the semaphore to be released and then open the window again.

..SS203 unconfigurable channel(s) 8E, 8F and/or FF detected

Meaning
The cdebug script identifies one or more channels for which the CHPID 8E (configuration of virtual consoles), 8F (logout device) and/or FF (identifier for invalid CHPIDs) has been allocated.

13.6 X2000 messages to the BS2000 console

If X2000 detects an error in a peripheral component that cannot be reported to BS2000 via an I/O then X2000 sends the following message to the BS2000 console:

```
SNX2000  AN ERROR HAS OCCURRED IN A PERIPHERAL COMPONENT – FOR FURTHER INFORMATION PLEASE
         CONSULT THE PRIMEPOWER SERVERVIEW APPLICATION DIAGNOSTIC. REPLY (EOT(CONTINUE))
```

Meaning
X2000 informs BS2000 of an error in a peripheral component that cannot be reported via an I/O. The message must be acknowledged by the operator.

Response
Locate the error using the diagnostic tool Logging V3 (via PRIMEPOWER ServerView) or by means of the `dmesg` command or in the messages file (`/var/adm`). Otherwise, inform the service staff.

13.7 EVENT error messages

If input errors occur in EVENT mode then the following messages are output in inverse video in line 24.

```
wrong password or timeout
```

Meaning
The password was entered incorrectly during input. The previous input is ignored.

Response
Repeat the operation.

```
input locked - type F2 KEY
```

Meaning
Input in EVENT mode has been locked.

Response
Press the F2 key to release input.

```
input rejected, invalid input for event
```

Meaning
The input is not valid in EVENT mode or it was written incorrectly.

Response
Check the input.

```
password of userid event (input terminated by [RETURN])
```

Meaning
Input in EVENT mode is protected by a password which is queried after the menu operation 'input on'.

Response
Specify the password for input in EVENT mode.

```
input too long, only 76 characters allowed
```

Meaning
The maximum input length of 76 characters has been exceeded.

Response
Press the ↵ key.

`input rejected, destination invalid`

Meaning
Messages in EVENT mode must be written in the form xx.text (xx=component in question and text=input text). The relevant component has been specified incorrectly.

Response
Repeat the input correctly.

`no command files present`

Meaning
The `command` file from `sx.command` does not exist.

Response
Specify the `command` file correctly in `sx.command`. The available commands can be listed using `sx.?`.

`command file not executable`

Meaning
An additional command file for which there are no execution rights has been created.

Response
Set the execution rights correctly.

14 Appendix

14.1 Hardware features of the SX Series Business Servers

Technical highlights of the business servers in the SX series are summarized in the following two sections. You will find further details of features specific to each model range in the section corresponding to the specific model range in the sections below.

14.1.1 The partitioning concept of the SX servers (without the entry-level models)

The SX server hardware is based on the hardware of the PRIMEPOWER servers. With the exception of the SX entry-level models, the SX hardware is designed so that existing hardware components (CPU, memory, input and output controllers, etc.) can be distributed across multiple partitions.

The entry-level models in the SX series are non-partitionable and designed exclusively for use with the operating system BS2000/OSD.

Different, independent operating systems, even within the framework of a virtual machine, and their related available applications, can be run on the different partitions. These operating systems and applications do not affect each other in their runtime.

Multiple partitioning enables a variety of redundancy capabilities. This also means that on SX servers practically all functional elements can be designed and configured redundantly (console interfaces, disks, power supply, peripherals, etc.).

The redundancy capabilities provided by operating multiple partitions are described in detail in the manual “SX Series Business Servers - Concepts and Functions” [1].

Each partition can be set up in one of the following ways:

- Within the framework of the physical partitioning, PPAR.
- Within the framework of the extended partitioning, XPAR (with the exception of the SX130 model range).

The basis for the division into physical partitions (PPARs) on SX130 servers is provided by the physical system boards (PSBs) and, as of the SX140 servers, the PSB mode of an SX server's system boards.

A physical partition can contain one or more physical system boards. A system board carries various hardware components such as CPUs, memories and PCI slots. The physical system boards are separated from each other in terms of hardware so that hardware problems on one system board cannot affect other system boards.
SX130 servers only offer physical system boards.

As of the SX140 servers "extended system boards" (XSBs) can also be configured on the system boards. Here also there are CPUs, memories and PCI slots on each extended system board. The division of these resources over the extended system boards depends on the model series concerned and is done according to a fixed schema which is not variable.

As of the SX140 servers every system board contained there can be operated either in PSB or XSB mode:

- Operating a system board in PSB mode means that this system board is used as a physical system board.
- Operating a system board in XSB mode means that one or more extended system boards can be used on this system board.

The XSB mode of the system boards forms the basis for the division into extended (logical) partitions (XPARs). An extended partition may contain one or more extended system boards. it is not possible to mix PSBs and XSBs in one partition.

The number of possible system boards (PSBs and XSBs) depends on the particular model and its version, as do the maximum number of processors and the size of the memory. You will find this information in this appendix in the section on the relevant model.

The figure below shows physical partitions based on physical system boards, using the SX130 as an example:

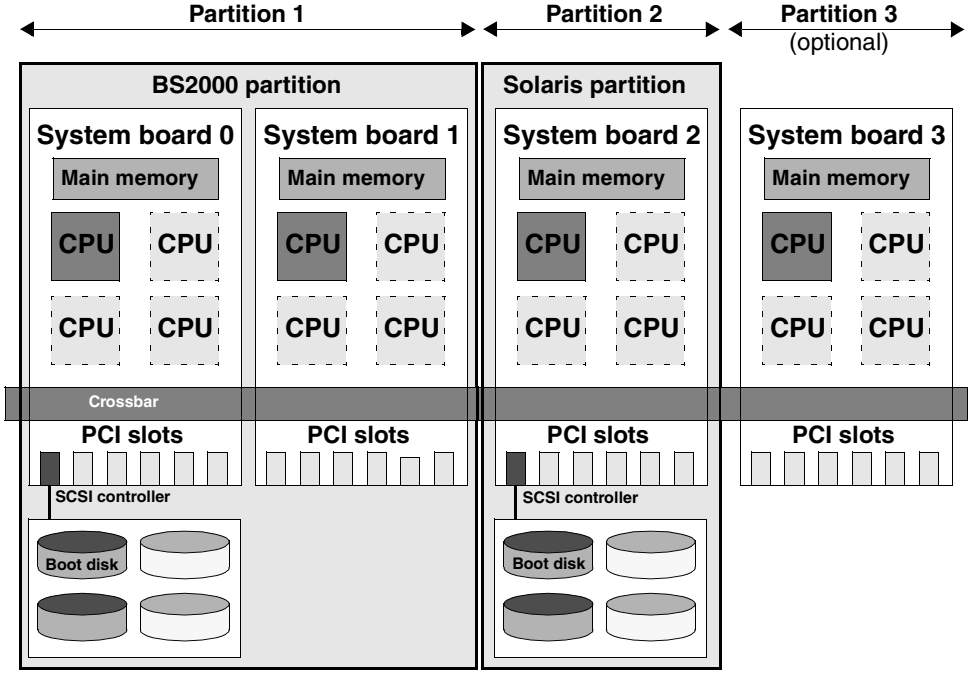


Figure 124: Example of creation of physical partitions

The figure below shows extended partitions based on extended system boards, using the SX140 as an example. The example also applies for SX150 (in the case of partitions with DR capability, however, the XSBs must be located on different PSBs):

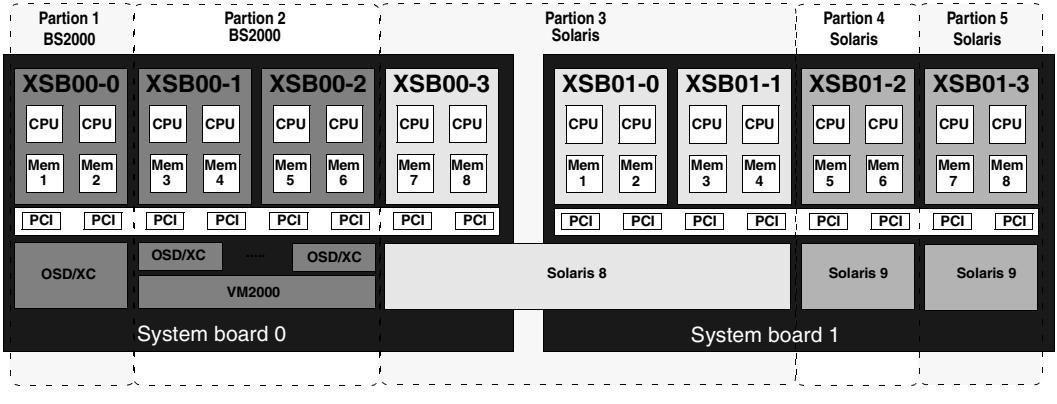


Figure 125: Example of creation of extended partitions

SX series business servers have the following types of partition depending on the operating system being run on the partition:

- BS2000 partition

  The BS2000/OSD with the X2000 carrier system is installed. X2000 is based on Solaris and mainly provides the runtime environment for BS2000/OSD.

  Here BS2000/OSD can also run under the VM2000 virtual machine system.

  The available CPUs of a BS2000 partition are divided logically into processing processors for BS2000/OSD and I/O processors which X2000 makes available to BS2000./OSD. The available memory is also divided between BS2000/OSD and X2000. You will find further information in this appendix in the section on the relevant model series.

- Solaris partition

  The Solaris operating system is installed.

The SX servers have at least one BS2000 partition.

The system boards (also the XSBs) of different partitions are separated from each other in terms of the hardware.

On SX130 systems the integrated SCSI disks for booting the relevant operating system are unambiguously assigned to the system boards concerned by plug connections. As of the SX140 model series they are operated via integrated SCSI controllers and are assigned to the XSBs via their slots. Each XSB has interfaces for boot disks, console, LAN, and a boot PROM. Use of the last two XSBs of a system board always requires the presence of a PCI/disk box.

Depending on the model and its configuration Capacity on Demand (CoD) enables the CPUs present on the system boards but currently not in use or those present on free, additional XSBs to be attached or detached as needed.
A description of the capability to temporarily increase the performance of the server in this way can be found in the chapter “Dynamic Reconfiguration” on page 285 or in the section “Capacity on Demand” of the manual “SX Series Business Servers - Concepts and Functions” [1].

As far as the BS2000 addressing modes in the program address space are concerned, the models in the SX series are fully compatible with the S servers. Data spaces are supported on SX servers as of BS2000/OSD V6.0 and X2000 V3.0A05.

14.1.2 SX server system peripherals

The SX series servers optionally provide full Fibre Channel connectivity for the connection of peripheral devices. This permits the SX servers to be seamlessly integrated into an intelligent SAN environment.

On a model-specific basis, the SX server for BS2000/OSD also supports an optional channel interface. This means that existing BS2000 channel peripherals can be used in parallel to new Fibre Channel peripherals. The entry-level models in the SX series have no channel interface.

The PCI slots present on each system board and in the PCI/disk boxes form the basic foundation for the numerous types of connections available for the SX server. The connection capabilities are determined by the type of controller used in each instance. The capabilities are only limited by the number of free PCI slots and by the existing configuration rules (if there are any).

Fibre Channel and bus peripherals

Fibre Channel peripherals are operated under BS2000/OSD by emulating the devices in X2000 as bus peripherals. The bus peripheral devices are connected via a suitable SCSI or Fibre Channel controller.

All devices released for the PRIMEPOWER family are available for Solaris partitions.

Information on these devices can be found in the data sheets about the SX server and in the operating instructions for the model series concerned.

Additional external devices (e.g. archive systems or disk storage systems) are connected via additional SCSI or Fibre Channel controllers.

The connection of a Fibre Channel switch allows SAN integration. You will find information about this at:
http://www.fujitsu-siemens.com/rl/products/storage/fibrechannelswitches.html

In the BS2000 partition the hardware-related administration and operation of the bus peripheral is performed via the X2000 carrier system. You make the devices of the bus peripheral known to the X2000 operating system, and therefore also to the BS2000/OSD operating system, by configuring them in X2000. It is not necessary to generate the bus peripherals in BS2000/OSD.

In a Solaris partition the SCSI and Fibre Channel peripherals are administered and operated using the corresponding Solaris functions.

You can find detailed information on configuring devices for BS200/OSD in the chapter “Global X2000 functions” on page 221.

Channel peripherals on BS2000 partitions

Channel peripherals are only possible on SX servers which support the optional channel interface. Channel peripherals are connected to the SX server via the optional channel subsystem (Universal Hot Plug System, UHPS). The channel subsystem is connected to a system board of the BS2000 partition using a corresponding PCI/SCI adapter. The maximum possible number of channel connections depends on the model series.

The channel types can be combined and configured as desired. Only multiple connections used for channel bundling and redundancy need to be configured in a single channel subsystem.

The devices in the channel peripherals are generated in BS2000/OSD.
The IOCF file generated here (IORSF format) is transferred to the X2000 carrier system and evaluated at the time of start-up. Information on generation can be found in the manual "BS2000/OSD-BC V6.0 - Migration Guide" [3].

Operating peripherals in SX servers with SMC

SX servers with SMC have an integrated system management console. The SMC is a PRIMESTATION or, as of the SX150 model series, a PRIMEPOWER250. The SMC is always integrated into the service rack of the SX server as a complete system (system unit with diskette drive, DVD drive and DAT drive as well as a TFT screen, keyboard and mouse). The SMC is connected to the partitions via both the internal system control LAN and the administration LAN. All functions for operating and monitoring the system unit, the partitions and the operating systems or virtual machine systems running on them are performed by the SMC.

You will find more details on the operating concept of the SX servers with SMC in the section "Operating concept for SX servers with SMC" on page 12.

The figure below provides an overview of the peripheral connections, using an SX150 Business Server as an example:

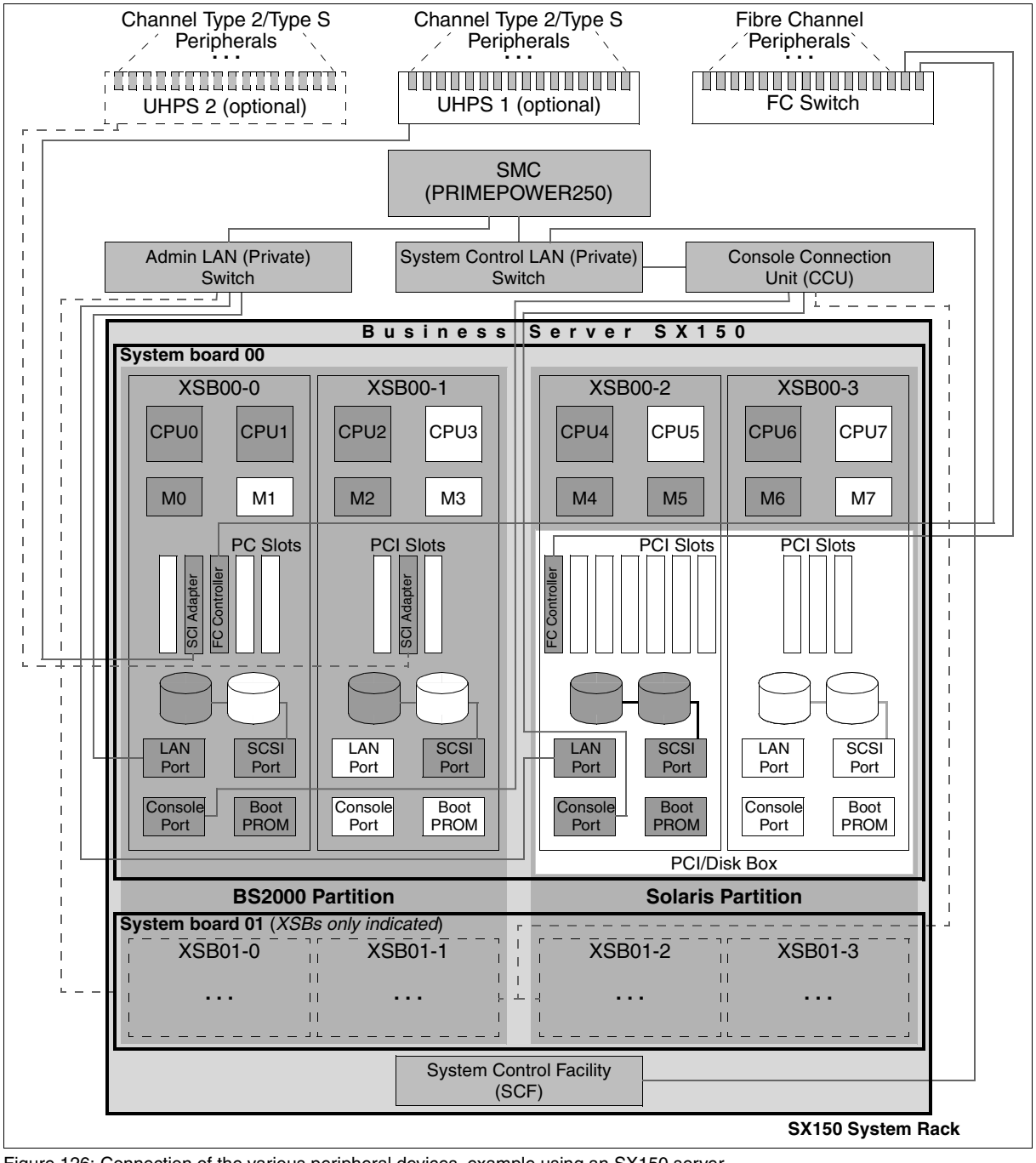


Figure 126: Connection of the various peripheral devices, example using an SX150 server

The connection possibilities are the same for the other models in the SX series, with the exception of the entry-level models.

Operating peripherals in SX servers without SMC

SX servers without SMC can be operated via the integrated console or via a LAN console. SX series entry-level models are shipped with an integrated console as standard where the the operating peripherals (keyboard, touchpad, TFT monitor) are connected directly to the graphics card installed on the server.

All instances for operating BS2000 (BS2000 console, BS2000 dialog) are available for operation and PRIMEPOWER ServerView is available for the BS2000 device administration.

You will find more details on the operating concept of the SX servers without SMC in the section “Operating concept for SX server entry-level models (without SMC)” on page 14.

14.2 Model ranges

This section describes the features specific to the model ranges of the Business Servers of the SX series.

14.2.1 SX100

Overview

- Designed exclusively for use with BS2000/OSD (does not support partitioning).
- Maximum memory for BS2000/OSD and X2000 combined: 8 GB.
- Optional Fibre Channel connection technology for FibreCAT and Symmetrix disk systems.
- Internally used hard disks and a magnetic tape cartridge changer with LTO drive.
- Optionally offers the connection of CentricStor and ITC/SBU via Fibre Channel
- Complete with integrated console (System Management Console (SMC) not available).
- Channel connections are not supported.

The models in the SX100 Business Server model range are designated SX series entry-level models.

This model range consists of the following:

Model	Capacity in RPF	CPUs for BS2000/OSD	CPUs for I/O (X2000)
SX100-C1	12	1	1
SX100-C2	20	1	1
SX100-C3	30	1	1

Table 13: SX100 series model range

Peripherals of the SX100 system

The basic version of the input/output system has two 73 GB hard disks configured as a mirrored system. Alongside the X2000 system partitions on these disks there are two BS2000 volumes, each 17 GB.

Optionally it is possible to install an additional DISK subsystem with 4 x 73 GB, which can be extended to a maximum of 14 disks.

As a further option a FibreCAT or Symmetrix disk storage system can be connected via the Fibre Channel.

Via Fibre Channel the option is also available of connecting CentricStor and ITC/SBU.

A magnetic tape cartridge changer with an LTO drive for backing up the user data is integrated in the rack.

The system includes a CD/DVD drive and a DAT drive.

The system is operated via the console connected up. The system also has a modem for the TELESERVICE server remote diagnostics and maintenance service

14.2.2 SX130

Overview

- Maximum equipment: 16 CPUs and 64 GB memory.
- Supports a maximum of 4 physical system board (PSBs), each with a maximum of 4 CPUs, 8 memory packages and 6 PCI slots.
- Supports physical partitioning (PPAR) only
- Maximum of 4 partitions is possible[1].
- Optional full Fibre Channel connectivity.
- Max. memory per BS2000 partition for BS2000/OSD and X2000 combined: 8 GB.
- Optional: maximum of 32 channel connections (of type 2 and/or type S) available for each BS2000 partition.

1. 4 Partitions on special release only

The SX130 Business Server model range (basic configurations) consists of the following:

Model	Capacity in RPF	CPUs for BS2000/OSD	CPUs for I/O (X2000)
SX130-10A/B/C	35/42/55	1	1
SX130-20A/B/C	63/75/88	2	1
SX130-30C	122	3	1
SX130-40C	155	4	1
SX130-50C	187	5	1
SX130-60C	217	6	2

Table 14: SX130 series model range

Servers in the SX130 series model range

The basic version of all SX130 series models has two system boards. These two system boards together usually form the first BS2000 partition. As an option you can set up a BS2000 partition and a Solaris partition with a system board for each. A BS2000 partition with only one system board has fewer expansion possibilities and fewer peripheral connections than a BS2000 partition with two system boards.

Two to four system boards are supplied depending on the model version. Up to four SPARC64 CPUs, each with 675 MHz, and up to 16 GB of main memory are available for each system board.

The table below and the following figure shows some possible usages for the basic version and for the expanded version of an SX130:

	Existing system boards	Partitioning	
		BS2000 partitionen	Solaris partitionen
Basic version	2	1	-
Alternative 1	3	1	1
Alternative 2	4	1 2 1	1 - 1/2/3[1]

Table 15: Partitioning in SX130 servers

[1] on special release only

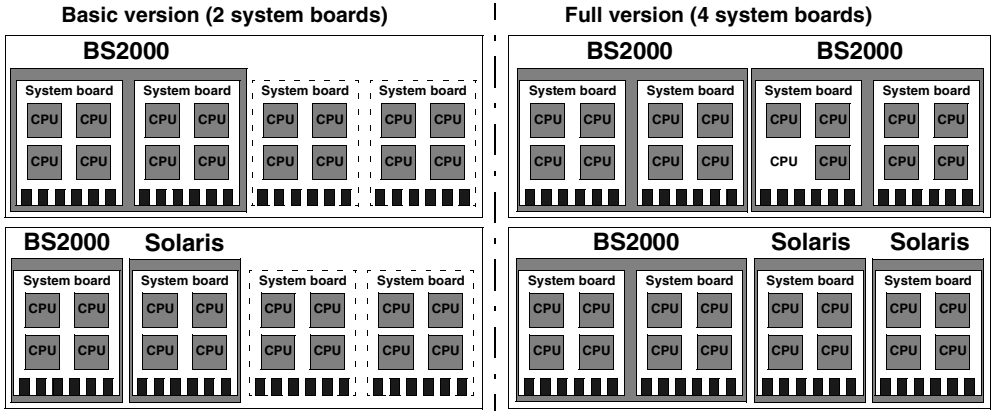


Figure 127: Examples of partitioning in SX130 servers

Six PCI slots are available for each system board, one of which is already occupied by an SCSI controller for connection to the system disks in each partition. Each system board is provided with an onboard integrated Ethernet controller.

The basic version of the SX130 series model is equipped with 4 GB of memory. The default configurations are 1024 MB of this memory for X2000 and 2048 MB of the memory for model SX130-40C or higher. For model SX130 server and higher an 8 GB main memory version is recommended.

Servers can be upgraded by adding CPUs. An SX130, for example, can be upgraded to model SX130-60C by adding a total of 8 used CPUs.

After one or two further system boards have been installed further partitions can be formed. The capacity values of a further BS2000 partition may be freely selected within the performance stages specified for the model range. For instance, a second BS2000 partition with 35 RPF as the development and quality assurance system can be integrated in an SX130-20C server with 88 RPF.

Models can be easily upgraded on site.

It is possible to exchange the following components during live operations (Hotswap capability):

- X2000 system disk
- System control board
- Air filter
- Power supply modules
- Fan modules

The maximum power supply protection can be achieved by using the optional dual power supply.

SX130 system peripherals

Channel peripherals (type 2 and type S) may be connected to the SX130 server via the optional channel subsystem. The channel subsystem is connected by an SCI controller and occupies a PCI slot of a system board in the BS2000 partition for up to 16 channel connections. A further optional channel subsystem can be connected to the second system board of the BS2000 partition, thus making a maximum of 32 channel connections available on an SX130 in a BS2000 partition. Any combination of the channels of type 2 and type S can be provided.

The channel subsystems are integrated in the service rack of the SX server.

In an SX130 server the system disks are integrated in the system cabinet (where there is an expansion for a second Solaris partition also in the service rack).

In the basic version two disks (with capacities of 72 and 36 GB respectively) are assigned to the (first) BS2000 partitions.

Optionally a FibreCAT or Symmetrix disk storage system can be connected via Fibre Channel.

CentricStor and ITC/SBU can also be connected via Fibre Channel.

As an option, an SKP-SR may also be used for operating an SX130 server (see section “SKP-SR for BS2000 operation” on page 409). The SKP-SR and any additional devices connected to it (e.g. ATOP) are built into the service rack. The SKP-SR and any other remote operating stations are connected via the LAN.

14.2.3 SX140

Overview

- Maximum equipment: 16 CPUs and 64 GB memory.
- Supports a maximum of 2 system board, each with a maximum of 8 CPUs, 8 memory packages and 8 PCI slots. Also 1 PCI/disk box with 10 PCI slots exists for each physical system board for model SX140-40C and higher.
- Each system board can be operated in PSB or XSB mode.
- Supports extended partitions (XPARs)
- In XSB mode up to 4 extended system boards can be configured for each physical system board (i.e. a maximum of 8 extended system boards can be used, see table 16).
- Each partition consists of at least 1 physical or extended system board; i.e. the following maximum numbers of partitions are possible:
  – 2 physical partitions
  – oder 8 extended partitions
  – or 1 physical und 4 extended partitions

  It is not possible to mix PSBs and XSBs in one partition.

  Each partition requires its own boot PROM. 2 boot PROMs are present on each system board and 2 more can be configured in each PCI/disk box.
- Minimum equipment per extended system board used: 1 CPU and 1 memory package.
- Optional full Fibre Channel connectivity.
- Max. memory per BS2000 partition for BS2000/OSD and X2000 combined: 12 GB
- Optional, a maximum of 32 channel connections (type 2 and/or type S) are available for each BS2000 partition.

The SX140 Business Server model range consists of the following (basic configuration):

Model	Capacity in RPF	CPUs for BS2000/OSD	CPUs for I/O (X2000)	XSB
SX140-10A/B/C	42/58/75	1	1	00-0
SX140-20A/B/C	94/113/133	2	1	00-0, 00-1
SX140-30C	185	3	1	00-0, 00-1
SX140-40C	235	4	1	00-0, 00-1, 00-2
SX140-50C	280	5	1	00-0, 00-1, 00-2
SX140-60C	320	6	1	00-0, 00-1, 00-2, 00-3

Table 16: SX140 series model range

Servers in the SX140 series model range

The basic versions of the SX140 model range have a single system board and can be extended by one system board.

In the basic configuration up to 7 SPARC64-CPUs, each with 1.3 GHz and up to 12 GB of memory, are provided for each BS2000 partition. Processors can be attached or detached as required without causing any system interruptions (Capacity on Demand).

Each system board can be operated in PSB or XSB mode. For each system board one physical board can be configured in PSB mode, and up to 4 extended system boards in XSB mode (i.e. on an SX140 system a total of 8 extended system boards can be used).

A system board has 8 processor slots, 8 slots for memory modules and 8 PCI slots. An extension by 10 PCI slots and 4 slots for hard disks is possible with the aid of a PCI/disk box.

Using XSB mode the hardware resources of a system board listed above can each be divided into 4 independent extended system boards (XSBs). The interface for setting or modifying PSB or XSB mode and its configuration is described in the section “Administering the system board’s operating mode” on page 75.
XSBs can then be used as the basis for extended partitions (XPARs). The interface for this function is described in the section “Configuring and modifying partitions” on page 78.

Here it is not necessary for the XSBs to be consecutive (XSBn, XSBn+1, XSBn+2,..., XSBn+m) in an extended partition; partitions may also be formed on the basis of XSB00-0 and XSB00-3, for example. This is important inasmuch as the XSBs are equipped differently with PCI slots (see figure 128 on page 400).

The table 16 indicates the XSBs that are used in the basic version of the different SX140 models.

As default, the first BS2000/OSD instance is installed on XSB_{00}. If the number of processors requires this, XSB00-1, XSB00-2, XSB00-3 are added in the sequence indicated. XSB00-2 and XSB00-3 require a PCI/disk box which is integrated in models SX140-40C,... , -60C.The same applies if XSB01-2 and XSB01-3 are to be used on the second physical system board.

The figure below shows the basic version of the SX140-10C model and some extension possibilities:

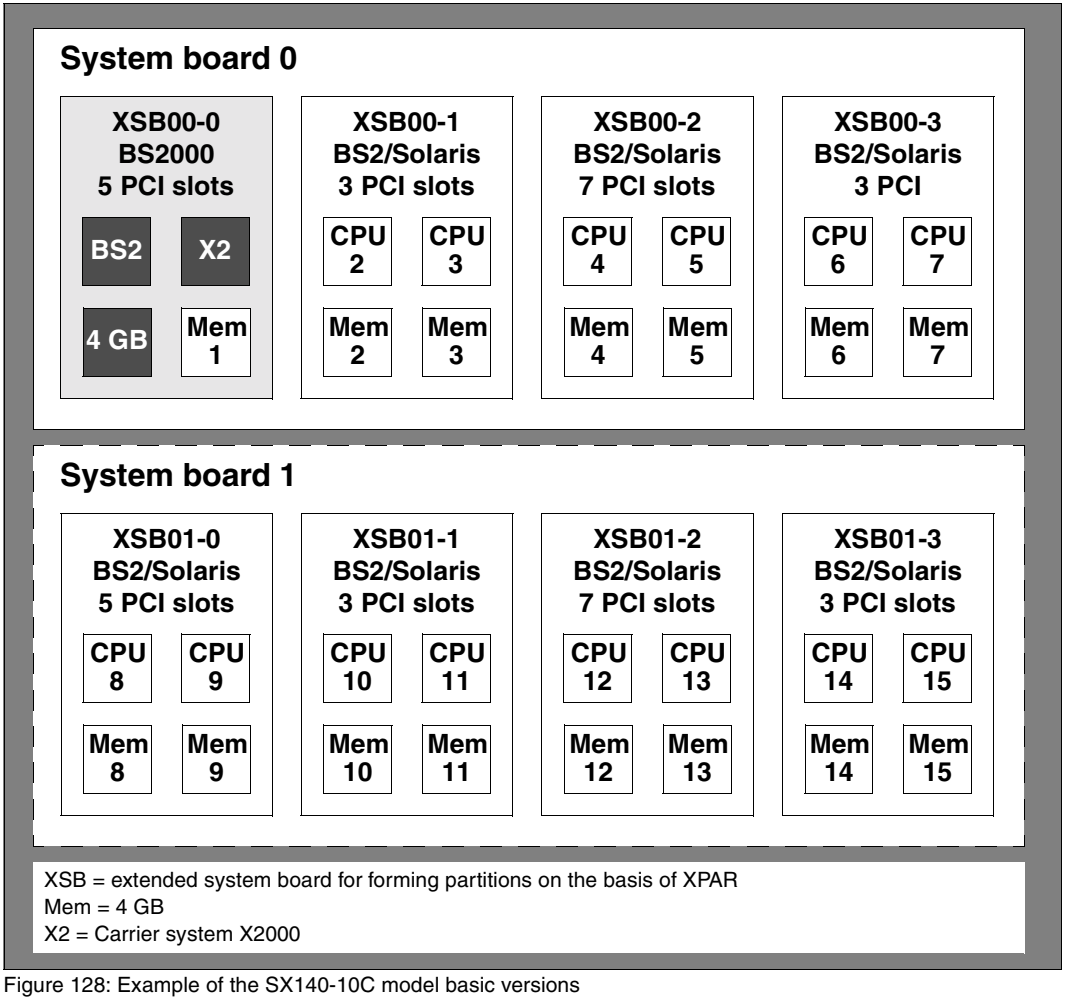


Figure 128: Example of the SX140-10C model basic versions

The basic versions of the additional BS2000 partition have the same performance classification as that of the first BS2000 partition. They are equipped with a model-specific number of processors, a model-specific memory capacity, 2 boot disks, power supply and fans so that they can be installed in the system cabinet in addition to the first BS2000/OSD instance.

The customer defines which XSBs are included in further partitions.

Servers can be upgraded by adding CPUs. An SX140, for example, can be upgraded to model SX140-60C by adding a total of 7 used CPUs.

Models can be easily upgraded on site.

Important system components, such as hard disks, power packs and fans, are designed redundantly and can be changed during live operation. The maximum power supply protection can be achieved by using the optional dual power supply.

The SX140 system has a highly available system control network; this has the following functions:

– It monitors and controls the operating status (temperature, fans, etc.).
– Defective memory blocks are handled without any effect on the system.
– It informs the console about error conditions.
– It forms the basis for preventive maintenance.
– It monitors and controls all cabinets via RCI (Remote Cabinet Interface).

Peripherals of the SX140 system

Channel peripherals (of type 2 and type S) can be connected to the SX140 server by a maximum of 2 channel chassis in a BS2000 partition. A maximum of 32 channels in total are therefore available on an SX140 in a BS2000 partition. Any combination of channels of type 2 and type S is possible.

The channel subsystems are built into the rack of the SX server.

Each system board has 2 onboard-integrated SCSI controllers for connecting the hard disks and 2 onboard-integrated Ethernet controllers.

In the basic version, two disks (each of 72 GB) are assigned to the (first) BS2000 partition.

Optionally a FibreCAT or Symmetrix disk storage system can be connected via Fibre Channel

CentricStor and ITC/SBU can also be connected via Fibre Channel.

14.2.4 SX150

Overview

- Maximum equipment: 16 CPUs and 64/128 GB memory.
- Supports a maximum of 2 system boards, each with a maximum of 8 CPUs, 8 memory packages and 8 PCI slots. Expansion by 10 PCI slots is possible using a PCI/disk box. The expansion is required if XSBs 00-2 and 00-3 of the first and/or XSBs 01-2 and 01-3 of the second system board are used.
- Each system board can be operated in PSB or XSB mode.
- Supports extended partitions (XPARs).
- In XSB mode up to 4 extended system boards can be configured for each physical system board, depending on the version (i.e. a maximum of 8 extended system boards can be used, see table 17).
- Each partition consists of at least 1 physical or extended system board; i.e. the following maximum numbers of partitions are possible:
  – 2 physical partitions
  – or 8 extended partitions
  – or 1 physical and 4 extended partitions

  It is not possible to mix PSBs and XSBs in one partition.
- BS2000/OSD supports Dynamic Reconfiguration of the partition.

  Each partition requires its own boot PROM. 2 boot PROMs are present on each system board and 2 more can be configured in each PCI/disk box.
- Minimum equipment per extended system board used: 1 CPU and 1 memory package.
- Capacity on Demand (CoD) offers the option of interrupt-free, temporarily limited performance enhancement.
- Supports Dynamic Reconfiguration (DR) of XSBs
- Supports PCI Hot Plug (PHP), i.e. it is possible to deactivate, remove, insert and activate PCI cards of the BS2000 partition during ongoing operation. All current PCI cards are supported except channel connections.
- Additional, dedicated processors can be used to support high-power performance of cryptographic applications.
- Optional full Fibre Channel connectivity.
- Max. memory per BS2000 partition for BS2000/OSD and X2000 combined: 32 GB
- Optional, a maximum of 32 channel connections (type 2 and/or type S) are available for each BS2000 partition.

The SX150 Business Server model range consists of the following (basic configurations):

Model	Capacity in RPF	CPUs for		Memory (GB)		PCI slots	SBs	XSBs on	
		BS2[1]	I/O[2]	Total[3]	X2000			SB 00	SB 01
SX150-10A/B/C	42/75/105	1	1	8	1	8	1	0, 1	
SX150-20A/C	140/180	2	1	8	1	8	1	0, 1	
SX150-30C	250	3	1	12	1	13	2	0, 1	0
SX150-40C	320	4	1	12	2	13	2	0, 1	0
SX150-50C	380	5	1	12	2	13	2	0, 1	0
SX150-60C	440	6	1	16	2	16	2	0, 1	0, 1

Table 17: SX150 series model range

1. BS2000 processors for processing in BS2000/OSD

2. I/O processors which X2000 provides for BS2000/OSD

3. For BS2000/OSD and X2000 together

Servers of the SX150 model series

The basic versions of the models SX150-10C and SX150-20C have a single system board and can be extended by one system board. The SX150-30x models and higher have two system boards in the basic configuration.

In the basic configuration up to 7 SPARC64-CPUs, each with 1.89 GHz and up to 16 GB of memory, are provided for each BS2000 partition. Processors can be attached or detached as required without causing any system interruptions (Capacity on Demand). Additional, dedicated processors can be used to support high-power performance of cryptographic applications.

Capacity on Demand (CoD)

Use of the Capacity on Demand (CoD) function provides the option of interrupt-free, temporarily limited performance enhancement. This function can be used for different usage periods.

Usage of additional CPU performance

In addition to the CPUs which are activated by default one or more CoD processors can also be used if this is contractually agreed. When required they are attached or detached during ongoing operation.

Modell	CPUs Standard	CPUs CoD max.	Performance of the CPUs Total of standard and CoD processors	
			Number	RPF
SX150-10C	1	1	2	180
SX150-20C	2	2	4	320
SX150-30C	3	3	6	440
SX150-40C	4	2	6	440
SX150-50C	5	1	6	440

Table 18: Usage of additional performance in the SX150 model series

Usage of additional system boards

On SX150 systems on which free XSBs are configured the CoD functionality must not be confined to attaching and detaching CPUs which are located on a system board assigned statically to the partition in question.
Entire system boards (CoD-XSBs) can be attached for a limited time and then detached again; during this period only the CPUs located on them can be used. For details see the chapter “Dynamic Reconfiguration” on page 285.

System boards

Each system board can be operated in PSB or XSB mode. For each system board one physical board can be configured in PSB mode, and up to 4 extended system boards in XSB mode (i.e. on an SX150 system a total of 8 extended system boards can be used).

A system board has 8 processor slots, 8 slots for memory modules and 8 PCI slots. An extension by 10 PCI slots is possible with the aid of a PCI/disk box. The extension is required if XSBs 00-2 and 00-3 of the first and/or XSBs 01-2 and 01-3 of the second system board are used. By default a memory module has a capacity of 4 GB and can optionally be replaced by an 8-GB memory module.

Using XSB mode the hardware resources of a system board listed above can each be divided into 4 independent extended system boards (XSBs). The interface for setting or modifying PSB or XSB mode and its configuration is described in the section “Administering the system board’s operating mode” on page 75.
XSBs can then be used as the basis for extended partitions (XPARs). The interface for this function is described in the section “Configuring and modifying partitions” on page 78.

Here it is not necessary for the XSBs to be consecutive (XSBn, XSBn+1, XSBn+2,..., XSBn+m) in an extended partition; partitions may also be formed on the basis of XSB00-0 and XSB00-3, for example. This is important inasmuch as the XSBs are equipped differently with PCI slots (see figure 128 on page 400).

The table 17 indicates the XSBs that are used in the basic version of the different SX150 models.

As default, the first BS2000/OSD instance is installed on XSB00-0 and XSB00-1. If the number of processors requires this, XSB01-1 and XSB01-2 on the second system board are added.

The figure below shows the basic version of the SX150-10C model and some extension possibilities:

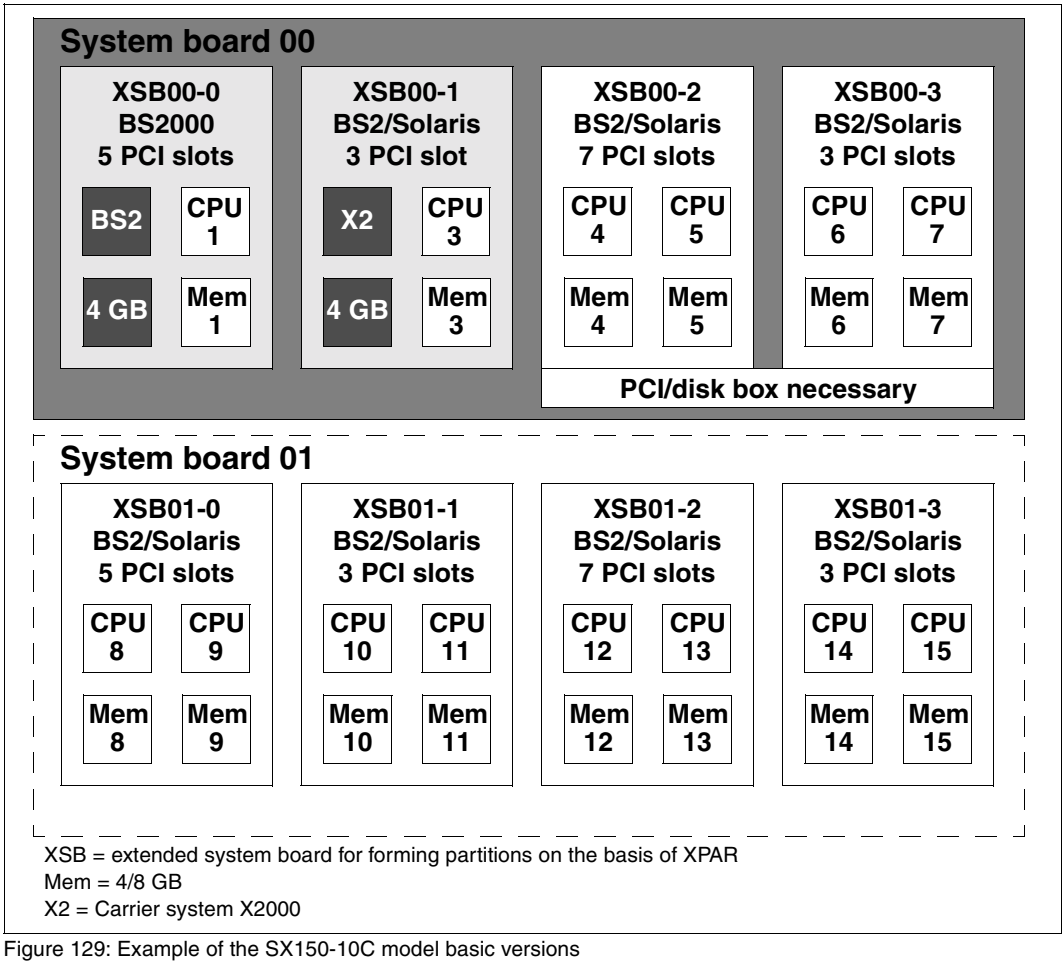


Figure 129: Example of the SX150-10C model basic versions

The basic versions of the additional BS2000 partitions have the same performance classification as that of the first BS2000 partition. They are equipped with a model-specific number of processors, a model-specific memory capacity, 2 boot disks, power supply and fans.
The customer defines which XSBs are included in further partitions.

Servers can be upgraded by adding CPUs. An SX150, for example, can be upgraded to model SX150-60C with a total of 7 used CPUs. Models can be easily upgraded on site.

FC, Ethernet and SCSI controllers can be replaced during ongoing operation, as can the redundant system components hard disks, power supplies and fans. The reconfiguration options of processors, memory and I/O system means that the SX150 system offers high availability. The maximum power supply protection can be achieved by using the optional dual power supply.

The SX150 system has a highly available system control network; this has the following functions:

– It monitors and controls the operating status (temperature, fans, etc.).
– Defective memory blocks are handled without any effect on the system.
– It informs the console about error conditions.
– It forms the basis for preventive maintenance.
– It monitors and controls all cabinets via RCI (Remote Cabinet Interface).

Dynamic Reconfiguration (DR)

The DR capability of the SX150 model series relates to the system board format and the configuration and cannot take into account any current and workload-generating applications.

The following functions are available in BS2000 partitions for performing Dynamic Reconfiguration:

- **DR-connect**
  Connection of an XSB with implicit attachment (ATTACH) of the CPUs, the memory and the I/O devices in BS2000/VM2000.
- **DR-disconnect**
  Disconnection of an XSB with implicit detachment (DETACH) of the CPUs and the I/O ports (exception: UHPS) in BS2000/VM2000.
- **Automatic recovery function**
  In a BS2000 partition with DR capability this function ensures that after a system reboot which was caused by a component failure (consequence: XSB failure), the system board with the failed XSB can be serviced for this partition during ongoing operation.

The following DR applications are supported here:

- Resource distribution/dynamic workload distribution between partitions of the server
- Capacity on Demand (CoD)
- Online maintenance (repair) after a fault

Detailed information is provided in the chapter “Dynamic Reconfiguration” on page 285ff.

Peripherals of the SX150 system

Channel peripherals (of type 2 and/or type S) can be connected to the SX150 server by a maximum of 2 channel chassis in a BS2000 partition. A maximum of 32 channels in total are therefore available on an SX150 in a BS2000 partition. Any combination of channels of type 2 and type S is possible.

Each system board has 2 onboard-integrated SCSI controllers for connecting the hard disks and 2 onboard-integrated Ethernet controllers.

In the basic version, two disks (each of 73 GB) are assigned to the (first) BS2000 partition.

Optionally a FibreCAT or Symmetrix disk storage system can be connected via Fibre Channel.

CentricStor and ITC/SBU can also be connected via Fibre Channel.

14.3 SKP-SR for BS2000 operation

The use of an SKP-SR for the SX130 Business Server is optional.

The SKP-SR can be used for the following applications:

- Operation of X2000 instances (e.g. BS2000 console) via LAN using preconfigurable virtual screens (not possible when using the Secure Shell)
- Operation of applications on an SX server with a graphical user interface (e.g. PRIMEPOWER ServerView) via LAN (not possible when using the Secure Shell)
- Operation of the SCS software (System Console Software) on the SMC
- Connection of an ATOP for automated system operation
- Connection of a radio clock and operation as an NTP server for the SMC

14.3.1 Operation of the SX server and the SMC via SKP-SR

Operation via SKP-SR virtual screens

If virtual screens for the SX partitions and the SMC have been configured at the SKP-SR, then these virtual screens can be used at the SKP-SR to operate the SX partitions and the SMC.

Operation of programs with a graphical user interface at the SKP-SR console

To start programs with a graphical user interface (e.g. PRIMEPOWER ServerView, SCS software for the SMC) from an SKP-SR login window, you must perform the following actions:

- Remote login at the SMC under a server/partition administrator login
- Reroute the graphical output to the SKP-SR console by setting the DISPLAY variables
- Call the corresponding application

The corresponding commands are described in detail in section “System console software (SCS)” on page 56 for System Console Software calls and in section “Starting PRIMEPOWER ServerView Suite” on page 196 for PRIMEPOWER ServerView calls.

14.3.2 Automatic system operation via ATOP

The ATOP is connected to the SKP-SR serial ports. One serial connection to the SKP-SR is required for each system to be monitored.

The monitor script must first control the SKP-SR login before logging in via LAN to the system login which provides access to the console that is to be monitored (e.g. cons0 for the BS2000 console).

14.3.3 Use as NTP time server

The SKP-SR can be used as an NTP time server for the SMC if a TSP radio clock 3919 or Global Time Server 3920 is connected to the SKP-SR and configured (for information on configuration, see the manual “SINIX-2000 V8.0/V8.1/V8.5” [19]).

Abbreviations

APCS	Automatic Power Control System
ATNS	Advanced Transport Name Service
CCU	Console Connection Unit
CDE	Common Desktop Environment
CHPID	Channel Path Identification
CoD	Capacity on Demand
CPU	Central Processing Unit
DAT	Digital Audio Tape
DDC	DC DC Converter
DNS	Domain-Name-Service
DR	Dynamische Rekonfiguration
DSSM	Dynamic Subsystem Management
ESA	Enterprise System Architecture
ESCoD	Enhanced Server Capacity on Demand
EM	Emulation
ESF	Enhanced Support Facility
FC	Fibre Channel
FEP	Front End Power supply
HAL	Hardware Abstraction Layer
HNC	High-speed Net Connect
IPL	Initial Program Load
IPMP	IP-Multipathing
IMON	Installation Monitor
ITC	Intelligent Tape Controller
JIT	Just In Time
KVP	German acronym for ‘Console Distribution Program’
LAN	Local Area Network

LTO	Linear Tape Open
MAC	Media Access Control
MTC	Magnetic Tape Controller
NTP	Network Time Protocol
OBP	OpenBoot™ PROM
OS	Operating System
OSD/XC	OSD Extended Configuration
PCI	Peripheral Component Interconnect
PHP	PCI Hot Plug
PID	Partition ID
POST	Power On Self Test
PPAR	Physical Partition
PPK	PuTTY Private Key File (file extension)
PRM	Print Resource Management
PROM	Programmable Read Only Memory
PSB	Physical System Board
PSR	Physical Save and Restore
PTF	Program Temporary Fix
RBAC	Role Based Access Control
RC	Remote Console
RCA	Remote Console Adapter
RCI	Remote Cabinet Interface
RS2K	Remote Service 2000
SAN	Storage Area Network
SB	System Board
SCF	System Control Facility
SCS	System Console Software
SCSI	Small Computer System Interface
SKP-SR	Service- und Konsol-Prozessor für SR2000
SMC	System Management Console
SPARC	Scalable Processor Architecture
SPD	Shared Private Disk
SSH	Secure Shell

TODR	Time Of Day Register
UA	Unit-Adresse
VCA	Virtual Channel Adapter
WAN	Wide Area Network
XB	Crossbar
XB-DDC	Crossbar DC-DC Converter
XPAR	Extended Partition
XSB	Extended System Board
WSA	Web based System Administration, WebSysAdmin (earlier designation of PRIMEPOWER ServerView)
WWPN	World Wide Port Name
XSCF	eXtended System Control Facility

Figures

Figure 1: Example of an SX server: SX150 Business Server 2
Figure 2: Structure of the documentation for the SX Series Business Servers 5
Figure 3: Example of an operating concept for an SX server 12
Figure 4: Operating concept of an SX server without SMC 14
Figure 5: Example of an operating concept for an entry-level model 15
Figure 6: Operating sequences when switching the SX server on/off 24
Figure 7: Operating sequences when switching SX server without SMC on/off 26
Figure 8: CDE login screen (user name) 28
Figure 9: CDE login screen (password) 28
Figure 10: CDE window after the first login on a SMC 29
Figure 11: Application Manager of the System Console Software (SCS) 30
Figure 12: “Create Action” window 32
Figure 13: Window for selecting an icon 33
Figure 14: Example for a command in the “Create Action” window 34
Figure 15: Example of a desktop 40
Figure 16: PRIMEPOWER ServerView window: “Create user” (cladmin) 47
Figure 17: PRIMEPOWER ServerView window: “Create user” (clmon) 50
Figure 18: PRIMEPOWER ServerView window: “Create group” 51
Figure 19: PRIMEPOWER ServerView window:”Create user” (administrator of PRIMEPOWER ServerView) 54
Figure 20: System console menu 56
Figure 21: Machine Administration Menu 58

Figure 22: Machine Administration Menu: “System-Specific Administration” 60
Figure 23: Machine Administration Menu: “System/Partition Power Administration” . . 61
Figure 24: Machine Administration Menu: “APCS Setup Menu” 67
Figure 25: PRIMEPOWER ServerView- window: “Create task” 72
Figure 26: Control panel of an SX140 or SX150 server 73
Figure 27: Configuration window 73
Figure 28: SB Mode Administration Menu 76
Figure 29: Partition and System Board Administration Menu, taking an SX150 server as an example 78
Figure 30: System Board Addition to Partition Menu, taking an SX150 server as an example 79
Figure 31: System Board Removal from Partition Menu, taking an SX150 server as an example 80
Figure 32: Machine Administration Menu: “Hardware Configuration Displays” 82
Figure 33: Machine Administration Menu: “System Notification Administration” 84
Figure 34: RC2000 main window 86
Figure 35: Sequence of POST, OBP and Solaris startup after switching on or a reset 88
Figure 36: Boot process sequence 91
Figure 37: Monitoring messages: Example for SX system error messages 92
Figure 38: NTP diagnostic command ntpq (example) 95
Figure 39: NTP diagnostic command ntptrace (example) 96
Figure 40: Calling XSCF administration via the Machine Administration Menu of the SMC 119
Figure 41: XSCF Administration Menu 119
Figure 42: XSCF shell 121
Figure 43: Overview of the commands of the XSCF shell 122
Figure 44: Machine Administration Menu Setting Monitoring Notification Information 127

Figure 45: Xconfig: Start window 135
Figure 46: Xconfig: Network and Communication window 136
Figure 47: Xconfig: XDMCP Startup Modes 136
Figure 48: Xconfig: Display and Video 137
Figure 49: Xconfig: Security, Access Control and System Administration 137
Figure 50: Xconfig: Editor 138
Figure 51: Exceed: Start window 138
Figure 52: CDE login screen. 139
Figure 53: CDE desktop after login. 139
Figure 54: SINIX-TE window. 142
Figure 55: Installing OPEN SOFTWARE 145
Figure 56: PuTTY Configuration: Session 148
Figure 57: PuTTY Configuration: Connection. 149
Figure 58: PuTTY Configuration: SSH 149
Figure 59: PuTTY Configuration: Tunnels. 150
Figure 60: PuTTY Configuration: Save 151
Figure 61: Example of user interface started from PuTTY 152
Figure 62: Opening a BS2000 console window under the CDE interface of the SMC 161
Figure 63: Screen areas for the CONS0 partner 178
Figure 64: Opening a BS2000 dialog box under the CDE interface of the SMC. 182
Figure 65: Example: Calling PRIMEPOWER ServerView. 197
Figure 66: Icon for Java Web Start 198
Figure 67: Start screen of Java Web Start 198
Figure 68: Java Web Start Application Manager. 199
Figure 69: Icon for PRIMEPOWER ServerView 199
Figure 70: PRIMEPOWER ServerView welcome screen 200

Figure 71: Presentation of non-accessible nodes in the hierarchy browser of PRIMEPOWER ServerView 201
Figure 72: Displaying and modifying authorizations in PRIMEPOWER ServerView . 203
Figure 73: Modifying access to the individual applications in PRIMEPOWER ServerView 204
Figure 74: The Bs2Devices user interface 205
Figure 75: Example selection configurator 207
Figure 76: Example object table 207
Figure 77: Example pull-down menu 208
Figure 78: Example context menu 208
Figure 79: Example pull-down menu: “Volumes+Pubsets” 210
Figure 80: Examples for “Volumes+Pubsets”: pull-down menu and drop-down menu 210
Figure 81: “BS2 Disks” subtab 211
Figure 82: “Volumes+Pubsets” subtab 213
Figure 83: “BS2 Tapes” subtab 214
Figure 84: “BS2 Printers” subtab 216
Figure 85: *Tools* button 218
Figure 86: Online help. 219
Figure 87: Mirror disks in a system 224
Figure 88: Menu field “Mirror configuration”“. 225
Figure 89: X2000 window for configuring a BS2000 tape device 234
Figure 90: X2000 window for reconfiguring a BS2000 tape device 235
Figure 91: Mercator welcome screen 243
Figure 92: Mercator configuration and administration window 244
Figure 93: Mercator printer configuration window (Basic). 245
Figure 94: Mercator printer configuration window (Connection) 246
Figure 95: Mercator printer configuration window (Configuration) 247

Figure 96: Mercator window with Xprint database (printer inactive) 248
Figure 97: Mercator printer configuration window (State) 249
Figure 98: Mercator window with Xprint database (printer active) 250
Figure 99: X2000 user interface for creating a BS2000 printer 252
Figure 100: X2000 window for creating a BS2000 printer 253
Figure 101: X2000 window for creating a Transdata printer 254
Figure 102: X2000 user interface (BS2000 printer) following printer configuration 256
Figure 103: Example of creating a new BS2000 LAN device 269
Figure 104: Basic menu of the off-line PSR 277
Figure 105: Slice selection 278
Figure 106: Selection of the tape device 279
Figure 107: Backup run of PSR 279
Figure 108: Setting a disk copy under PSR 281
Figure 109: Example of an SX server with DR capability 297
Figure 110: Online maintenance: Temporary operation (until online maintenance) with reduced resources 299
Figure 111: Online maintenance: Temporary operation (until online maintenance) of the CPUs of CoD-XSB 300
Figure 112: Online maintenance: Permanent use of all resources of the CoD-XSB . . 301
Figure 113: Outputting an overview of partitions and system boards (example) 304
Figure 114: Ascertaining the hardware resources of the partition and their distribution to XSBs (example) 304
Figure 115: Removing an XSB (example) 306
Figure 116: Shifting an XSB (example) 307
Figure 117: PRIMEPOWER ServerView: Modifying OBP settings 323
Figure 118: Window for defining the system settings 326
Figure 119: Window for defining the locale parameters 327
Figure 120: Window for defining tasks 329

Figure 121: Start buttons in PRIMEPOWER ServerView 332
Figure 122: “Tools” tab in PRIMEPOWER ServerView 332
Figure 123: Starting the functions Mirror, CSR and PSR from the drop-down menu . . 333
Figure 124: Example of creation of physical partitions 387
Figure 125: Example of creation of extended partitions 387
Figure 126: Connection of the various peripheral devices, example using an SX150 server 391
Figure 127: Examples of partitioning in SX130 servers 396
Figure 128: Example of the SX140-10C model basic versions. 400
Figure 129: Example of the SX150-10C model basic versions. 406

Tables

Table 1: Functionality of the administrator user group in the SCS 45
Table 2: Overview of the access options to XSCF 118
Table 3: XSCF functions available via a Web browser 123
Table 4: Message texts with message code SVR0002 170
Table 5: Function keys for the terminal type dtterm 186
Table 6: MF-II special key assignments (9750) 186
Table 7: MF-II-special key assignments (EMDS) 187
Table 8: Function keys for terminal type 97801 187
Table 9: Functions on the menu bar and toolbar 206
Table 10: Sharing (sh) and switching (sw) between system types 230
Table 11: Operating mode for printers equipped with cutters 259
Table 12: Settings in PRIMEPOWER ServerView and corresponding OBP settings . . . 322
Table 13: SX100 series model range 393
Table 14: SX130 series model range 395
Table 15: Partitioning in SX130 servers 395
Table 16: SX140 series model range 399
Table 17: SX150 series model range 403
Table 18: Usage of additional performance in the SX150 model series 404

Related publications

The manuals are available as online manuals, see *http://manuals.fujitsu-siemens.com*, or in printed form which must be payed and ordered separately at *http://FSC-manualshop.com*.

[1] **SX Series Business Servers**
Concepts and Functions
User Guide

Target group
This manual is designed for technical decision-makers who want to find out about the applications of the SX Series Business Servers, and for users who want to familiarize themselves with the operation of the SX servers.
Contents
This manual describes the concepts and the architecture of SX Series Business Server. The SX servers use the operating system BS2000/OSD, which has been ported to SPARC64 architecture, within the software package OSD/XC. The manual thus also describes the features of OSD/XC. A description of the Solaris operating system is also included, as this can be run in parallel on the SX servers.

[2] **SX1xx Business Servers**
Operating Manuals

Target group
The manual addresses privileged users (operators, system administrators) of the SX1xx Business Servers.
Contents
The manual describes the hardware of the SX1xx Business Servers insofar as it is required for system operation.

[3] **BS2000/OSD-BC V6.0**
Migration Guide
User Guide

Target group
Systems support and system services
Contents
The Migration Guide summarizes the individual work steps required for a changeover from BS2000/OSD-BC V4.0 or V5.0 to BS2000/OSD-BC V6.0 and offers hints for converting back to the old version.
The Migration Guide also describes the migration of S Servers under BS2000/OSD or SR2000-B/-C Business Servers under OSD-SVP to an SX server under OSD/XC.
Order number
U21630-J-Z125-6-76

[4] **OSD/XC**
Performance Guidelines
User Guide

Target group
Computer center and system support staff.
Contents
This manual focuses on the principles and measures involved in evaluating the performance of BS2000/OSD applications which run on SX systems with SPARC64 architecture. The performance-related characteristics of the SX server architecture are described together with the underlying operating sequences. Extensive information on tuning the configuration and the software make it possible to optimize the economic efficiency of OSD/XC operation.

[5] **PRIMEPOWER ServerView Suite V2.2**
System Administration within a Domain

Target group
System administrators and customer service staff.
Contents
The manual describes the administration of computers in a domain using the PRIMEPOWER ServerView graphical user interface.

[6] **PRIMEPOWER ServerView Suite V2.2**
Integration in Enterprise Server Management Systems

Target group
System administrators and customer service staff.
Contents
This manual describes two products, which allow integrating the PRIMEPOWER ServerView Suite in the two global IT management products CA Unicenter NSM and Tivoli.

[7] **System Console Software User's Guide (SCS)**
User Guide

Target group
This manual is intended for the use by system administrators and users operating and maintaining the system.
Contents
This manual describes the software product System Console Software, which operates on System Management Consoles connected to servers and supports the operation and maintenance of the server.

[8] **Machine Administration Guide**
User Guide

Target group
This manual is intended for system administrators responsible for system operation and maintenance (depending on the hardware used).
Contents
This manual is intended for systems where the Solaris (TM) Operating Environment is installed, and explains the Machine Administration functions required to support system operation and maintenance (depending on the hardware used).

The manual is to find on the data medium ESF² in the directory
`/manual.pdf/english/ als madm_ome.pdf. bzw. /manual.pdf/japanese/madm_ome.pdf)`

[9] **LAN Console and System Management Console (SMC)**
Installing, Configuring and Operating
System Administrator Guide

[10] **PRIMEPOWER250/450**
User Guide

[11] **BS2000/OSD-BC**
Commands, Volumes 1 - 5
User Guide

Target group
This manual is addressed to nonprivileged users and systems support staff.
Contents
Volumes 1 through 5 contain the BS2000/OSD commands ADD-... to WRITE-... (basic configuration and selected products) with the functionality for all privileges. The command and operand functions are described in detail, supported by examples to aid understanding. An introductory overview provides information on all the commands described in Volumes 1 through 5.
The Appendix of Volume 1 includes information on command input, conditional job variable expressions, system files, task switches, and device and volume types.
The Appendix of Volumes 4 and 5 contains an overview of the output columns of the SHOW commands of the component NDM. The Appendix of Volume 5 contains additionally an overview of all START commands.
There is a comprehensive index covering all entries for Volumes 1 through 5.

[12] **BS2000/OSD-BC**
Introductory Guide to Systems Support
User Guide

Target group
This manual is addressed to BS2000/OSD systems support staff and operators.
Contents
The manual covers the following topics relating to the management and monitoring of the BS2000/OSD basic configuration: system initialization, parameter service, job and task control, memory/device/system time/user/file/pubset management, assignment of privileges, accounting and operator functions.

[13] **BS2000/OSD-BC**
System Messages, Volumes 1 - 3
User Guide

Target group
This manual is addressed to systems support staff, operators and users.
Contents
Chapter 1 deals with message processing in BS2000/OSD. Chapter 2 contains the system messages of the message classes for the basic configuration of the BS2000/OSD operating system. The messages are arranged in alphabetical order by message class and are accompanied by explanatory texts where appropriate.
Volume 2 and 3 contain the second and third part of system messages of the message classes for the basic configuration of the BS2000/OSD operating system.

[14] **VM2000** (BS2000/OSD)
Virtual Machine System
User Guide

Target group
System support staff and operators in BS2000/OSD, VM2000 and VM administrators
Contents
VM2000 is available for S and SX servers.
The manual describes the VM2000 Virtual Machine System. It contains:
– an introduction to VM2000
– installation, system initialization and termination
– operation, management and error diagnosis
– a description of the VM2000 commands

[15] ***open*CRYPT** (BS2000/OSD)
Security with Cryptography
User Guide

Target group
This manual is intended for system administrators and users of the cryptographic interface in BS2000/OSD. To ensure cryptographically secure application programming it is assumed that the programmer has knowlege of the cryptographic functions implemented.
Contents
– Architecture
– Installation, start up and configuration
– Implementation of the PKCS#11 standard in BS2000/OSD
– Description of the cryptographic functions and interfaces in BS2000/OSD
– Return codes and messages

[16] **Assembler Instructions** (BS2000/OSD)
Reference Manual

Target group
BS2000/OSD assembly-language programmers
Contents
This manual describes in alphabetical order all (nonprivileged) assembler instructions of the CPUs supported by BS2000/OSD. For each instruction the following is described:
– its function
– its assembler format, i.e. how to write it in assembly language
– its machine format, i.e. how it is represented in the CPU
– its execution sequence in detail
– any condition codes values which it sets
– possible program interrupts when it is executed
– programming notes
– one or more examples

[17] ***open*Net Server** (BS2000/OSD)
BCAM
User Guide

Target group
The manual is intended for network planners, generators and administrators who define BCAM BS2000 systems.
Contents
The manual describes BCAM itself, how it is embedded in TRANSDATA and TCP/IP and ISO networks, plus generation and administrative activities. Generation examples illustrate the description. Additionally BCAM tools for generation and diagnosis are described. To conclude, the manual describes BCAM commands required for generation and operation. Information is also provided on KOGS macros required for statistical generation and a list of BCAM error messages is given.

[18] ***open*SM2** (BS2000/OSD)
Software Monitor Volumes 1 and 2
User Guide

Target group
This manual is addressed to users and systems support staff.
Contents
The monitoring system SM2 supplies users with statistical data on the performance of their DP systems and on resource utilization.
Volume 1 of the manual describes operation of the SM2 monitor, the SM2 monitoring programs and the SM2 screen reports.
Volume 2 of the manual describes the SM2U1 utility routine for editing and administering the SM2 output files, and the analysis routines SM2R1, ANALYZER, INSPECTOR and SM2-PA.

[19] **SINIX-2000 V8.0/V8.1/V8.5**
Installation, Operation and Administration
User Guide

Target group
The manual is intended for privileged users (operators, system administrators) of the service/console processor 3970-2x, the channel adapters 3970 and 3971, the business server SR2000-C, and the enterprise data server DS2000.
Contents
The manual contains all the information required to ensure that the systems service/console processor 3970-2x, channel adapters 3970 and 3971, business server SR2000-C, and enterprise data server DS2000 are ready for use. This includes helpful information on configuring the systems and a description of important functions for system operation and administration.

[20] **PRM** (BS2000/OSD)
User Guide

Target group
This manual is intended for SPOOL users, system support staff and RSO device administrators.
Contents
The manual describes the PRM utility routine for creating and managing print resources for BS2000 SPOOL. Use of PRM is mandatory when working with SPOOL as of Version 3.0.
The manual describes the two PRM user interfaces: the SDF statements for interactive and batch mode and the FHS-based menu interface for interactive mode.

[21] **BS2000/OSD**
Softbooks English
CD-ROM

Target group
BS2000/OSD users
Contents
The CD-ROM "BS2000/OSD SoftBooks English" contains almost all of the English manuals and README files for the BS2000 system software of the latest BS2000/OSD version and also of the previous versions, including the manuals listed here.
These Softbooks can also be found in the Internet on our manual server. You can browse in any of these manuals or download the entire manual.
Order number
U26175-J8-Z125-1-76
Internet address
http://manuals.fujitsu-siemens.com

[22] **Xprint Management V6.0A GUI**

Target group
Xprint administrators who use Xprint management functions.
Contents
The manual describes the functions of the Xprint graphical user interface (GUI). You use the GUI to monitor and configure all the host computers, printers and tasks in your domain. In addition, all the forms and fonts available in your domain can be displayed in the GUI.

[23] **EMDS** (SINIX)
User Guide

Target group
EMDS users and system administrators
Contents
– Emulation of the 9750 Terminal
– EMDS function menus
– Emulation of printers
– Installation and administration of EMDS

[24] **CMX V5.1 (Solaris)**
Communications Manager Solaris
Operation and Administration
User Guide

Target group
System administrators
Contents
The manual describes the function of CMX as mediator between applications and the transport system. It contains basic information on configuration and administration of systems in network environments.

[25] **Dynamic Reconfiguration**
Introduction to the Procedure

Target group
System administrators, administrators, service engineers
Contents
This document deals with dynamic reconfiguration. Dynamic reconfiguration is a procedure that allows the hardware units of a computer system to be configured without having to interrupt the functioning of its operating system. This type of configuration therefore also allows any applications located on the system to continue operating.
This document provides an introduction to this procedure. It describes the basics of the procedure and its approach and explains this using examples.

Only available online:
http://manuals.fujitsu-siemens.com -> „UNIX based servers“

[26] **Dynamic Reconfiguration User's Guide**
User Guide

Target group
System administrators
Contents
This User Guide contains a detailed description of how the system administrator must proceed when using Dynamic Reonfiguration. It also documents the service commands which can be used to obtain further information on the course of Dynamic Reconfiguration. Furthermore it includes a list of messages which can be output during Dynamic Reconfiguration.

The manual is contained on the ESF² volume in the directory
`/manual.pdf/english/` as `dr_ome.pdf`.

[27] **Partition Operation Guide**

Target group
System administrators, administrators, service engineers
Contents
The manual describes the procedure for the dynamic reconfiguration of the PRIMEPOWER/GP7000F high-performance models (system unit) and the use of the system on the system unit.

Only available online:
http://manuals.fujitsu-siemens.com -> „UNIX based servers“

[28] **Solaris System Diagnostics**

Target group
System administrators, administrators, service engineers
Contents
This manual describes system diagnostics on PRIMEPOWER type systems using the log system Logging V3.0 in PRIMEPOWER ServerView. It also describes the monitoring of RM peripheral cabinets, which are connected to a PRIMEPOWER type system.
The appendix contains information on how errors are reported and handled by the system, and how you can respond to system halts, hangups and bottlenecks.

[29] **Enhanced Server Capacity on Demand ESCoD**

Target group
System administrators, administrators, service engineers
Contents
The manual describes the principle, the functioning and the operation of the tool “Enhanced Server Capacity on Demand” (ESCoD).

[30] **EventAdmin Enhanced Event Management**

Target group
System administrators, administrators, service engineers
Contents
The manual describes the principle, the functioning and the administration of the product *EventAdmin* (Enhanced Event Management).

[31] **Teleservice (Unix)**
User Guide

Target group
The manual is intended for customers and operators of Teleservice Centers.
Contents
The manual describes the basic technical functioning of the Teleservice software. It also provides guidelines for users and system administrators as well as information on tools and modem validation.

[32] **PRIMEPOWER450/250 Extended System Control Facility (XSCF)**
User's Guide

Target group
This manual is intended for users, specifically system management/maintenance administrators.
Contents
This manual describes the system monitor and control facility (eXtended System Control Facility (XSCF) used to control, monitor, operate, and service PRIMEPOWER series servers and their systems.

The manual is contained on the ESF² volume in the directory
`/manual.pdf/english/ as xscf_ome.pdf`

[33] **System Administrator Guide: IP-Services**
Online-Dokumentation von Sun

Target group
System administrators
Contents
Dokumentation zu IP-Multipathing (IPMP).

Only available online:
http://docs.sun.com -> „Select Solaris version“ -> „System Administrator Collection“ -> „System Administrator Guide: IP-Services“

[34] **PowerPath**
Online-Dokumentation von EMC

Target group
System administrators
Contents
Dokumentation zu PowerPath.

Only available online:
http://www.emc.com/products/software/powerpath.jsp

Environmental protection

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Index

$DIALOG mode 189
/390 1
/390 firmware 3

3919 410
3920 410
9750 emulation 134, 143
  configuring 188
  notes on operation 186
97801 terminal 180

A
administrator
  BS2000 52
  partition 49
  server 46
  Solaris 52
  spool 175
Application Manager 30
ATNS 264
ATOP 410
automatic IPL 215

B
background color 36
backup
  configuration data 218
  physical 218
BCAM, DR-secure connection 272
browser 134, 140
BS2 crypto ports 217
BS2 devices 211
BS2 disks 211
BS2 KVP 215
BS2 LAN ports 217
BS2 printers 216
BS2 tapes 214
BS2 users 211
BS2000 $DIALOG mode 189
BS2000 CONSOLE mode 159
  access 160
  exit 181
  inputs 180
  logging 181
  menu function 164
  number of operator terminals 164
  outputs 181
  screen structure 178
BS2000 disk 221
BS2000 dump IPL 171
BS2000 installation 213
BS2000 partition 2, 388
BS2000 shutdown command 216
BS2000 transaction processing mode 190
BS2000, DR run 316
bs2drstat 311
bs2drstat logging file 314
button bar 220

C
CDE 12, 14
CDE control panel 29
channel initialization 172
channel peripherals 390
character class 327
character set 35
chinit 172
cladmin 46

clmon 49
Cluster Recovery Lock 320
CoD (Capacity on Demand) 289
command
  OBP 89
  scslbackup 104
  scslrestore 105
  shutdown 216
  su 18
  SVP 159
  xlsfonts 35
configuration
  2-disk 228
  3-disk 228
  9750 emulation 188
  activating 215
  automatic IPL 215
  BS2000 devices 257
  BS2000 disks 211
  displaying 81
  dtterm window 35
  fjge driver 271
  NTP server 94
  parameter 89
  partition 82
  partitioning 81
  print server 251
  printers 216, 242
  private disks 213
  protection mechanisms 19
  pubsets 213
  PuTTY 148
  querying 193
  server hardware 82
  ServerView domains 195
  SMC as an NTP server 94
  system disk mirroring 218
  UNIX printer 257
  Xprint printers 242
configuration data
  backing up 218
  CDE interface 104
  displaying 212
  modifying 212
  restoring 218
  System Console Software 98
configuration data backup 218
configuration file for NTP 94
configuration-policy 321
connection password 184
Console Administration 120
CPU performance
  temporarily adding 297
  temporarily releasing 298
CSR 218, 333
currency notation 328
currency symbol 260

D

D3435 223, 230, 231
D3475-8F 223, 230, 231
date 326
date format 327
DCE cluster 93
dipl 171
disk types 223
displaying EVENT commands 192
documentation for the SX series Business Servers 4
DR
  aborting 315
  administrative interface 304
  automatic recovery function 287
  command interface 308
  diangosis 313
  initiating DR process 312
  logging run 314
  problem handling 313
  relevant OBP settings 321
  run in BS2000/VM2000 316
DR (Dynamic Reconfiguration) 285
DR lock, canceling 315
DR-connect 286, 291, 307, 313
drcstat 308
DR-disconnect 287, 291, 306, 313
driver package 271
dtterm terminal 180
dtterm terminal emulation 35

DUMPDIR 326
Dynamic Reconfiguration 285
PRIMEPOWER ServerView 304

E
EM9750 mode 182
EMC Powerpath 108, 110
emulation, printer 247
entry model 1
entry-level model 1
environment variable 327
error messages 327
escape sequence 258
establishing connection 183
euro currency symbol 260
EVENT mode, entering the commands 191
Exceed 135
extended system board mode (XSB mode) 285
extended system board operating mode (XSB mode) 75

F
Fibre Channel disk 223
file system
backup 108
recovery 113
fjgi driver 271
FJSVged 271
function keys, programmable 166

G
Global Time Server 410

H
HAL 3
hardware resources, redistributing 288
hierarchical browser 207
Hot Swap 305
hotswap capability 396

I
installation
BS2000 213
Mercator 242
System Management Console 94
IOH memory 172
iohdump 172
iorsf 172
iorsf list 172
IOS memory 172
iosdump 172
IP 245
IP multipathing (IPMP) 293
ipl 169
ISO 8859-15 260

J
Java machine 134

K
keep 312

L
language 200, 328
LAN-PC 16
Latin-9 260
load
bootblk 91
kernel 91
mini kernel 89
PFKeys 167
ufsboot 91
locale parameters 327
LOCLAN connections 266
Logging V3.0 23
lowercase 327
LP-EMUL 258

M
magnetic tape cartridge device 232
Mail Administration 120
main memory 211
memory dumps 326
menu bar 206
Mirror 333
mirroring 218
model range SX100 393
model range SX130 395

model range SX140 399
model range SX150 403
monitor script 410
MSCF 320
MSCF cluster 169
MTC device
configuring 234
displaying the occupancy status 240
exclusive use of 232
occupying when host communication disrupted 239
setting an occupancy option 193
showing occupancy status 193

N
Network Configuration 120
next 312
no-io-sb 321
no-mem-sb 321
no-obp-sb 321
normal mode 258
NTP time server 410
number notation 327

O
object compatibility 1
object list and table 207
OBP
commands 89
setting via PRIMEPOWER ServerView 322
setting, command parameter 322
settings of system boards 321
occupancy option 193
occupancy status 193, 240
online maintenance, after hardware fault 289
OpenBoot PROM 15
operating mode
BS2000 CONSOLE mode 159
EM9750 mode 182
operating peripherals 390
OSD Extended Configuration 1
OSD/XC 1
outputting X2000/Solaris version numbers 192

P
param 172
partition
outputting information 308
possible distribution 296
possible division 395
partition administrators 49
password 211, 330
patch 192
PFKey file
deleting 168
showing 166
physical backup 218
physical system board 386
physical system board mode (PSB mode) 286
physical system board operating mode (PSB mode) 75
PPAR 385
PREFORM record 258
PRIMEPOWER 1
PRIMEPOWER ServerView Suite 53, 304
modifying OBP settings 323
starten 196
printer
BS2000 216, 252
configuring 216, 242
select 175
TRANSDATA 216
printer model 247
private disk 213
processors 211
PSB (physical system board) 386
PSB mode 75, 286
PSR 218, 333
pubset 213
PuTTY 147

R
radio clock 410
redistribution of hardware resources 288
regular expressions 207
remote service 22
Remote Service 2000 23
reset 313

resource management, global 288
responses to messages in BS2000 CONSOLE mode 159
restore configuration data 218
rs2k 23

S
SCS 56
SCS checkbox 29
SCSI disk 221
security 17
select printer 175
selection configurator 207
server administrator 46
shutdown command 216
SINIX-TE 134, 142
SKP-SR 409
SLED 171
SNMP Administration 120
Solaris 1
Solaris 8 12
Solaris 9 12
Solaris administrator 52
Solaris DR logging file 314
Solaris partition 2, 388
Solstice Disk Suite 108, 110, 224
sort order 327
SPARC64 technology 1
spool administrator 175
SSH Administration 120
start BS2000 169
stratum 93
subtab bar 207
SVL lock 213
SX100 1
SX150 model series 285, 402
sxadmin 46
system board
  automatic recovery function 287
  extended system board (XSB) 285
  OBP settings 321
  outputting information 308
  physical 386
  PSB mode 75, 286
  XSB connecting 286
  XSB disconnecting 287
  XSB mode 75, 285
  XSB system board pool 285
system console menu 56
System Console Software 56
system information 211
system language 328
system memory dumps 326

T
tab bar 207, 220
Tasks 329
Teleservice 22
Teleservice Call Management 23
terminal
  9750 emulations 143
  97801 142
  preconfiguring 32
terminal emulation 35
time 326
time format 327
time server 410
time zone 326
TNS 264
toolbar 206
tools 332
transaction processing mode 190
TRANSDATA printer 216
transparent mode 258
TSP radio clock 410

U
uppercase 327
User Account Administration 120

V
Veritas LVM 108, 110
view last messages 165
vipl 171
VM monitor 171
VM2000 171, 318
  DR run 316
vmmr 171

Volumes+Pubsets 213
VSN 213

W
workload distribution, dynamic 288
wsauser 46, 54

X
X servers 134
X2000 211
X2000 DR logging file 314
x2prtpci 309
XCS cluster 93
XSB
  assigned 303
  connecting 286
  disconnecting 287
  failure 287
  integrated 303
  shifting 307
XSB mode 75, 285
XSB system board pool 285
XSCF (Extended System Control Facility) 117
  access via console 122
  access via Web browser 123
  configuration 119
  shell 121
XSCF Web Administration 120
X-Window interface 12, 14

Z
ZASLAN 271

Contents

1	**Preface**	**1**
1.1	Documentation for the SX Series Business Servers	4
1.2	Target groups	7
1.3	Summary of contents	7
1.4	Notational conventions	9
2	**Operating concept of the SX servers**	**11**
2.1	Operating concept for SX servers with SMC	12
2.2	Operating concept for SX server entry-level models (without SMC)	14
2.2.1	Operation with integrated console	15
2.2.2	Operation with a LAN console and remote console adapter	15
2.3	Remote operation via LAN-PC	16
2.4	Notes on security	17
2.4.1	Passwords	17
2.4.2	Login access to root in the partitions	17
2.4.3	FTP access to root	18
2.4.4	User roles for SX servers with SMC	18
2.4.5	Security when accessing BS2000 operation functions	19
2.4.6	Secure access with Secure Shell (open SSH)	20
2.5	Remote service (Teleservice)	22
2.6	Overview of operating sequences on server switch-on / switch-off	23
2.6.1	SX server with SMC	24
2.6.1.1	Switch-on of the SX server and automatic start-up of the operating systems	24
2.6.1.2	Automatic termination of operating systems and server switch-off	25
2.6.2	SX server entry-level models	26
2.6.2.1	Switch-on of entry-level model and automatic start-up of BS2000/OSD	26
2.6.2.2	Automatic termination of BS2000/OSD and server switch-off	26
3	**Functions of the Solaris-CDE interface**	**27**
3.1	CDE interface	28
3.2	System administration of BS2000 and Solaris (optional)	31
3.3	Preconfiguring terminals	32
3.3.1	Parameters for configuring an action for a dtterm terminal emulation	35
3.3.2	Solaris shell (not on entry-level models)	36
3.3.3	BS2000 console	37
3.3.4	BS2000 dialog	38

3.3.5 PRIMEPOWER ServerView (BS2000 system) . . . 39
3.3.6 Machine Administration Menu (for entry-level models only) . . . 39
3.4 Calling terminal instances . . . 40

4 Functions of the System Management Console . . . 43
4.1 User groups and logins . . . 44
4.1.1 Server administrator . . . 46
4.1.2 Partition administrators . . . 49
4.1.3 BS2000 or Solaris administrators . . . 52
4.1.4 Administration of PRIMEPOWER ServerView . . . 53
4.2 System console software (SCS) . . . 56
4.3 Functions of the System Console Software (SCS) . . . 58
4.3.1 Machine Administration Menu . . . 58
4.3.1.1 Functions for switching the server on/off . . . 59
4.3.1.2 Switching the server on/off on a scheduled basis . . . 66
4.3.1.3 Switching partitions on/off on a time-driven basis . . . 71
4.3.1.4 Administering the system board's operating mode . . . 75
4.3.1.5 Configuring and modifying partitions . . . 78
4.3.1.6 Configuring/changing the partitioning . . . 81
4.3.1.7 Displaying the configuration . . . 81
4.3.1.8 Error notifications . . . 84
4.3.2 Consoles of the partitions with RC2000 . . . 86
4.3.2.1 OBP . . . 88
4.3.2.2 Starting Solaris . . . 91
4.3.3 Monitoring messages . . . 92
4.4 Time synchronization between SMC and the partitions . . . 93
4.5 Backing up/restoring the SMC . . . 97
4.5.1 SCS configuration data . . . 98
4.5.1.1 Backing up the configuration data of the System Console Software (SCS) . . . 98
4.5.1.2 Restoring configuration data of the System Console Software . . . 98
4.5.2 System drive . . . 100
4.5.2.1 Backing up the system drive of the SMC . . . 100
4.5.2.2 Restoring the system drive of the SMC . . . 102
4.5.3 Configuration data of the CDE interface . . . 104
4.6 Backing up/restoring systems in the partitions . . . 107
4.6.1 Methods . . . 107
4.6.2 Data backup . . . 108
4.6.3 Recovery . . . 113
4.7 XSCF . . . 117
4.7.1 Functionality of XSCF . . . 117
4.7.2 Access options to XSCF . . . 118
4.7.3 Configuration of XSCF . . . 119
4.7.4 Accesses to XSCF . . . 121

5 Functions of the SX server entry-level models . . . 125
5.1 Switching on/off functions . . . 125
5.2 Machine Administration menu . . . 126
5.2.1 Notification of the system administrator . . . 126
5.2.2 Timed switching on/off of the server . . . 128
5.3 Integrated console . . . 129
5.4 LAN console and RCA . . . 130
5.5 Time cluster with external time servers . . . 131

6 Remote operation via PC . . . 133
6.1 Recommended hardware and software configuration . . . 133
6.2 Configuration and operation . . . 135
6.3 Access with Secure Shell . . . 144
6.3.1 Installing OpenSSH . . . 144
6.3.2 Configuring the OpenSSH daemon . . . 146
6.3.3 Configuring the PC client side . . . 147
6.3.3.1 Configuring the administration PC for Exceed use via Secure Shell . . . 147
6.3.3.2 Using Exceed via Secure Shell . . . 151
6.4 Key management for Secure Shell . . . 153
6.4.1 Generating the keys . . . 153
6.4.2 Use of SSH agents . . . 155
6.4.3 PuTTY with PuTTYgen and Pageant . . . 157

7 Operating BS2000 instances . . . 159
7.1 Starting BS2000 . . . 159
7.2 BS2000 console mode . . . 159
7.2.1 Accessing BS2000 console mode . . . 160
7.2.2 The Main KVP Function Menu . . . 164
7.2.3 Structure of the KVP screen . . . 178
7.2.4 Inputs . . . 180
7.2.5 Outputs . . . 181
7.2.6 Logging inputs and outputs . . . 181
7.2.7 Exiting BS2000 console mode . . . 181
7.3 EM9750 mode . . . 182
7.3.1 Establishing a connection with the EM9750 emulation . . . 183
7.3.2 BS2000 $DIALOG mode . . . 189
7.3.3 BS2000 transaction processing mode . . . 190
7.4 EVENT mode . . . 191
7.4.1 Possible EVENT commands . . . 192
7.4.2 Querying the version numbers of the installed X2000/Solaris software . . . 192
7.4.3 Information on patches . . . 192
7.4.4 MTC devices . . . 193
7.4.5 Querying the configuration . . . 193
7.4.6 Permitting/inhibiting input and changing a password . . . 194

8 The X2000 user interface . . . 195
8.1 Notes on configuring PRIMEPOWER ServerView domains . . . 195
8.2 Starting PRIMEPOWER ServerView Suite . . . 196
8.3 Privilege concept with Role-Based Access Control . . . 201
8.4 X2000 BS2Devices main window . . . 205
8.4.1 Menu functions . . . 208
8.4.1.1 Function call . . . 208
8.4.1.2 Available functions . . . 209
8.4.1.3 Function types . . . 209
8.4.1.4 Functions . . . 210
8.4.2 X2000 tools main window . . . 218
8.4.3 Online help . . . 219

9 Global X2000 functions . . . 221
9.1 BS2000 disks: Configuration and BS2000 installation . . . 221
9.1.1 Internal SCSI disk . . . 221
9.1.2 Fibre Channel disks (RAID systems) . . . 223
9.2 Mirroring of internal disks in X2000 . . . 224
9.2.1 PRIMEPOWER ServerView Suite interface . . . 225
9.2.1.1 Window of the boot mirror disk . . . 226
9.2.1.2 Actions . . . 226
9.2.2 Error situations . . . 228
9.2.2.1 Replacing a defective disk . . . 228
9.2.2.2 Disk failure . . . 228
9.3 Additional information for disks . . . 229
9.3.1 Default partitioning of the root disk . . . 229
9.3.2 Rules of usage for disks D3435 and D3475-8F . . . 230
9.3.3 Change of format from disk D3435 to disk D3475-8F . . . 231
9.4 Magnetic tape cartridge devices . . . 232
9.4.1 Basic conditions for configuration . . . 233
9.4.2 Configuring an MTC device . . . 234
9.4.3 Adding a BS2000 system after initial configuration . . . 237
9.4.4 Removing a BS2000 system after initial configuration . . . 237
9.4.5 Occupying an MTC device when X2000 communication is disrupted . . . 239
9.4.6 Displaying the occupancy status of an MTC device . . . 240
9.5 Configuring printers . . . 242
9.5.1 Configuring Xprint printers . . . 242
9.5.1.1 Starting Mercator . . . 242
9.5.1.2 Configuring a new printer . . . 244
9.5.2 Configuring the SEH Printserver . . . 251
9.5.3 Configuring a BS2000 printer . . . 252
9.5.4 Starting up an emulated BS2000 printer . . . 257
9.5.5 Using printer-specific functions with the BS2000 printer type LP-EMUL . . . 258
9.5.6 Emulation options for controlling the X2000 printer emulation . . . 260

9.6 Local and remote communications . . . 264
9.6.1 ATNS . . . 264
9.6.1.1 Generating the TNS entries . . . 264
9.6.1.2 Example of setting up a connection . . . 266
9.6.2 Using the LAN connections . . . 266
9.6.2.1 LOCLAN . . . 266
9.6.2.2 LOCLAN between guest systems . . . 268
9.6.2.3 ZASLAN . . . 271
9.6.3 Diagnostics for LAN ports . . . 273
9.7 Offline PSR . . . 274
9.7.1 Scope of function . . . 274
9.7.2 Operation of the off-line PSR . . . 275
9.7.2.1 Starting the off-line PSR . . . 275
9.7.2.2 The basic menu . . . 277
9.7.2.3 Save . . . 278
9.7.2.4 Restore . . . 280
9.7.2.5 Copy . . . 281
9.7.2.6 Check . . . 282
9.7.2.7 Label . . . 282
9.7.3 Supported hardware . . . 283
9.7.3.1 System type SX entry-level model . . . 283
9.7.3.2 System type SX server with SMC . . . 283

10 Dynamic Reconfiguration . . . 285
10.1 Functional scope, concepts and applications . . . 285
10.1.1 Functional scope and features . . . 285
10.1.2 Applications for DR and recommendations . . . 288
10.1.3 The DR concept for BS2000 . . . 291
10.1.4 Requirements for DR . . . 293
10.1.5 An example of the DR scenarios . . . 296
10.2 Performing DR . . . 303
10.2.1 Administrative interface PRIMEPOWER ServerView . . . 304
10.2.2 The command interface . . . 308
10.2.3 Execution of DR, diagnosis and problem handling . . . 313
10.2.4 DR runs in BS2000 . . . 316
10.2.5 Settings relevant to DR . . . 321

11 Solaris: system administration . . . 325
11.1 X2000 partition . . . 325
11.1.1 System settings . . . 325
11.1.2 Locale parameters . . . 327
11.1.3 Recurrent tasks . . . 329
11.1.4 User and group administration . . . 330
11.2 Solaris partition . . . 331

11.3 PRIMEPOWER ServerView Suite application “Tools” . . . 332

12 What if 335
12.1 Self-Loading Emergency Dump - SLED . . . 335
12.2 sx.diag command . . . 336
12.3 Create X2000 diagnostic documents . . . 337
12.4 Create an IOH/IOS dump . . . 338

13 X2000 messages . . . 339
13.1 KVP messages . . . 339
13.2 SVP emulation messages . . . 344
13.3 IOD messages . . . 348
13.3.1 Messages referring to bus devices . . . 348
13.3.2 Messages referring to channel devices . . . 352
13.4 HAL messages . . . 358
13.5 X2000 channel connection error messages . . . 362
13.5.1 Structure of message numbers . . . 362
13.5.2 Metasyntax . . . 363
13.5.3 HWA error messages . . . 363
13.5.4 HWI messages . . . 364
13.5.5 MAIN messages . . . 367
13.5.5.1 ciodebug messages . . . 367
13.5.5.2 cdebug messages . . . 367
13.5.5.3 channel_ipl messages . . . 368
13.5.5.4 Logout system messages . . . 370
13.5.5.5 channeld messages . . . 372
13.5.5.6 cinit messages . . . 374
13.5.5.7 set_spd messages . . . 375
13.5.5.8 ctest messages . . . 376
13.5.6 Initialization script messages . . . 379
13.6 X2000 messages to the BS2000 console . . . 381
13.7 EVENT error messages . . . 382

14 Appendix . . . 385
14.1 Hardware features of the SX Series Business Servers . . . 385
14.1.1 The partitioning concept of the SX servers (without the entry-level models) . . . 385
14.1.2 SX server system peripherals . . . 389
14.2 Model ranges . . . 393
14.2.1 SX100 . . . 393
14.2.2 SX130 . . . 394
14.2.3 SX140 . . . 398
14.2.4 SX150 . . . 402
14.3 SKP-SR for BS2000 operation . . . 409
14.3.1 Operation of the SX server and the SMC via SKP-SR . . . 409

14.3.2 Automatic system operation via ATOP 410
14.3.3 Use as NTP time server 410

Abbreviations 411

Figures 415

Tables 421

Related publications 423

Environmental protection 435

Index 437

SX Series Business Servers

Operation and Administration

Target group
The manual is intended for privileged users (operators, system administrators) of the SX Series Business Servers.
Contents
The manual contains all the information required to ensure that the SX Series Business Servers are ready for use. This includes helpful information on configuring the system and a description of important functions for system operation and administration.

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